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Lemonia philopalus (Donzel, 1842) and *Phragmites australis* weed studies at Burullus Lake, Kafr EL-Sheikh Governorate, Egypt

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Abstract
The current study was conducted from 2002 to 2004 to survey the most common species of insect fauna associated with the flora at Burullus Lake, Kafr El-Sheikh Governorate. Two locations were chosen to carry out this work. The first was Bar Bahary Penninsula, and the second was Alazawey Island. The insect, *Lemonia philopalus* (Donzel, 1842), lays its eggs on the common reed, *Phragmites australis*, and the larvae attack plants, resulting in considerable damage, which is considered a biocontrol to weeds. The insect was reared for several generations; the lifecycle lasted 50-60 days. Unfortunately, the larvae walking on the human skin cause irritation.

Keywords: *Lemonia philopalus* biocontrol *Phragmites australis* weeds common reed Insects on *Phragmites australis*

Introduction
Lakes and natural protectorates are closed ecosystems that contain many wild plants and weeds that act as suitable habitats and provide a suitable environment for various insect fauna species. Burullus Lake in Kafr El-Sheikh Governorate is considered one of the most important northern lakes in Egypt. It occupies an area of about 100,000 feddan and ranks second in Egypt after El manzala Lake in Dakahlia Governorate. Burullus Lake has been subjected to a gradual shrinkage during the last few years due to land reclamation along its southern peripheries. Its area was approximately 140,000 feddans in 1913, 136,500 feddans in 1956, and 100,000 feddans in 1984, with the current area of Burullus Lake being 100,000 feddans [1]. Burullus Lake is of great scientific importance because of its wide area, and diversity of flora and fauna. Burullus Lake is of great importance due to the variety of flora and fauna it supports. One of the important weeds dominant in the lake is the common reed, *Phragmites australis.* [2] Concluded that the most important function of *Phragmites australis* in North America is to eliminate sledge from sewage treatment plants [3]. Reported that *Phragmites* australis supports flora in different ecosystems of North America. In addition, this weed alleviates heavy metals, enhancing vegetative cover and stabilizing soil. Due to enhancing the flora, the fauna of such ecosystems becomes more diversifiable.
In Germany, [4] indicated that the *P. australis* is attacked by more than 100 insect pests, most of which are stem borers. These borers are vulnerable to parasitoid attacks; accordingly, the weed contributes to biological diversity. Common Reed *Phragmites australis* is a perennial grass with a cosmopolitan distribution that can occur in a wide range of habitats [5]. Common reed thrives in sunny wetland habitats. It grows along drier borders and elevated areas of brackish and freshwater marshes, as well as along riverbanks and lakeshores. The species is particularly prevalent in disturbed or polluted soils with alkaline and brackish waters but will tolerate highly acidic conditions. It can grow in water up to 6 feet deep and also in somewhat dry sites. It can be found along roadsides, ditches, open wetlands, riverbanks, lake shores, dredged areas, and disturbed or undisturbed plant communities [6]. *Phragmites australis* (common reed) is one of the most extensively distributed species of emergent plant worldwide. The adaptive features of this plant show its competitive character. Owing to the high intraspecific diversity of common reed, as well as its phenotypic plasticity, the plant shows a broad ecological amplitude.

Moreover, the plant exhibits a high capacity for acclimatisation to environmental conditions that are considered adverse. [7]. This study is aimed at surveying the most common insects in the lake. The biology of *Lemonia philopalus* (Donzel, 1842) (Fam leomniidae, or: Lepidoptera) was investigated at the laboratory of the Economic Entomology Department, Faculty of Agriculture, Kafr El-Sheikh University and the laboratory of the Plant Protection Research Institute, ARC, Egypt.

Materials and Methods

The present study was conducted to survey the insect fauna associated with the flora at Burullus Lake, Kafr El-Sheikh Governorate. This study lasted from 2002 to 2004. Two locations (Fig. 1) were chosen to carry out this work; the first site was Bar Bahary Penninsula, and the second was Alazawey Island. The map (Fig.1) was obtained from the Area Administration, Kafr El-Sheikh Governorate.

The Lake Description

According to [1]. The following is the description of the lake:
Lake Burullus is considered the second most important lake in Egypt, after El- Manzalah Lake. It occupies an area of about 100,000 Feddans. It occupies the northern margins of the Nile Delta along the Egyptian Mediterranean coast between longitudes 30 ° and 31 ° and latitudes 31 °. It is situated between the two Nile gorges of Rosetta to the west and Damietta to the east.
The lake is directly connected with the Mediterranean Sea on its eastern side through Boughas El-Bourg, which is 250 meters long, 50 meters wide, and 1–5 meters deep. About 75 islets are scattered throughout the lake with varying surface areas. The most important islets are shown in Fig. (1). The lake depth ranges between 50 and 160 cm. In general, the western sector of the lake has an average depth of about 115 cm. The middle sector, being the deepest part, attains a depth of 90 cm according to the shallowness of the lake.

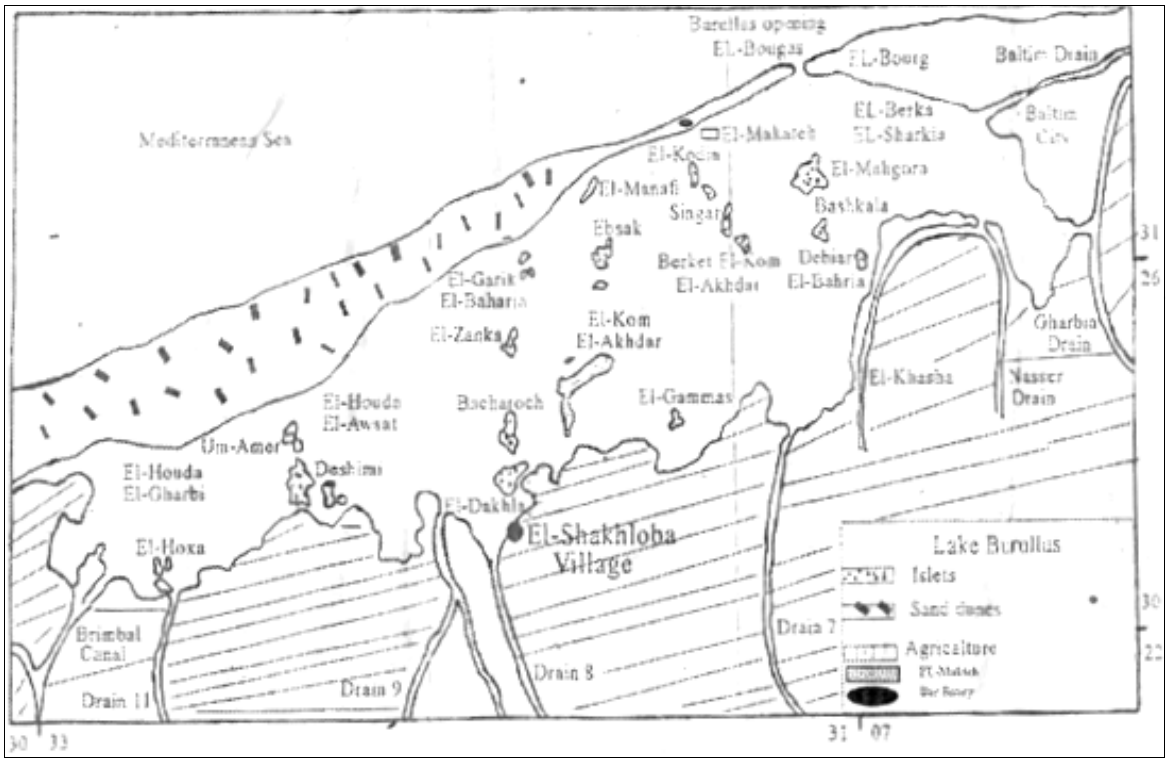

Fig 1: Map of the study area showing morphology of Burullus Lake and trapping sites

Lemonia philopalus (Donzel, 1842) research: a new pest from Burullus Lake

Field research

These studies were carried out at two locations in Kafr El-Sheikh, Governorate, in Burullus Lake from 2002 to 2004. Larvae were found to attack weed plants, causing considerable damage. The field observations, symptoms, and nature of the damage were recorded.

Laboratory research

In the 2003 and 2004 seasons, *Lemonia philopalus* (Donzel, 1842) larvae were collected from the weeds and transferred to the laboratory. Larvae were reared using the hygrostat technique as recommended by [8]. The emerging moths were introduced into oviposition cages and the egg-masses laid by each female were daily counted and incubated to hatch under laboratory conditions (24–26 c and 70–75% RH).

***Lemonia philopalus* (Donzel, 1842) food preference on crops and four weeds:** This experiment was carried out during the 2003–2004 season. Eight host plant species were selected (Tables 1 and 2). These plants were four economic corps and four weeds grown at Burullus Lake. Larvae of the fourth instar were collected from the lake and transferred to the laboratory. Under laboratory conditions, larvae were fed on the natural host plant, common reed, *Phragmites australis*, for 24 hrs. After that, the larvae starved for six hours. One larva of *Lemonia philopalus* was introduced into a plastic vial containing a piece of common reed, *Phragmites australis* leaf, and a piece of each of the other tested hosts (Fig. 2). Each treatment was replicated ten times. The total amount of food consumed by one larva was estimated at six hours after feeding to calculate the consumed area of the leaf.

Table 1: Parameters of host plants used in the experimental food preference test

Host plant	Plant area cm²		Weight (g)		1Cm=wt/ g	1Cm=dry/g
			Wet	Dry		
Phragmites australis L.	02.3		1.03	0.712	0.02	0.0136
Echinornia crassipes	61.5		2.28	1.905	3.7	0.0309
Pennisetum purpureum Schumach 1827	53.25		1.2	0.961	0.0002	0.018
Cyperus fuscus	300	30	0.62	0.704	0.02	0.0022
Gossypium sp.	3625	36.25	1.04	0.835	0.03	0.0230
Oryza sativa L.	3600	36	0.52	0.403	0.01	0.0011
Ipomoea batatas L.	3808	38.08	0.6	0.595	0.02	0.010625
Zea mays L.	5000	50	0.95	0.474	0.019	0.01494

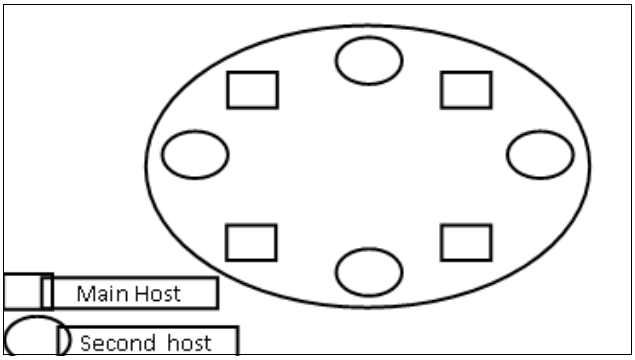

Fig 2: Food preference test

Table 2: Plant species usedin preference test

Common Name	Species	Family
Napier grass	*Pennisetum purpureum* Schumach	Gramineae
Common Reed	*Phragmites australis* L.	Gramineae
Nutsedge	*Cyperus* sp.	Cyperaceae
Watrhyacinth	*Echinornia crassipes*	Echinorniaceae
Sweet potatoes	*Ipomoea batatas* L.	Solanaceae
Cotton	*Gossypium* sp.	Mulvaceae
Rice	*Oryza sativa* L.	Gramineae
Maize	*Zea mays* L.	Gramineae

Fig 3: The egg masses *Lemonia philopalus* laid on a leaf weed

Fig 4: Bores induced by *Lemonia philopalus* larvae

Results and Discussion

Natural hosts: behavior and damage of the pest *Lemonia philopalus*

In the present work, results indicated that the females of *L. philopalus* laid their eggs on weeds and their larvae attacked the common reed, *Phragmites*, and caused considerable damage. It was observed that when the larvae of the insect stick themselves to the skin of a human-being, they cause severe irritation [8]. was first identified as *L. philopalus* that was collected with a light trap in the Giza region, Egypt, while, in Portugal, [10] recorded this species on some weeds and some plants such as *Sonchus* spp., *Hieracium* spp., *Crepis* spp., *Sonchus oleraceus*, *Taraxacum* sp., and *Lettuces* sp. [11]. The egg masses of this moth were laid on leaf weed plants and the larvae fed on leaves, causing considerable damage to these plants. [12]. Females of the insect were observed to be attracted to dry and erect plants and lay their eggs on the lower surface of dry leaves and stems (Fig. 3). The first instar larvae feed on the remaining yolk in the eggs hatched. The larvae make wide and deep galleries in stems (Fig. 4), resulting in tunnels in the cortical layer of a stem, causing blackness on its upper part, and the larvae metamorphose into pupal stage inside cocoons on the upper surfaces of leaves. The activity period started in May and ended in late November.

Laboratory studies

Host preference of L. *philopalus* larvae

Data in Table (3) shows that larvae preferred *Zea mays*, as the amount of consumed leaf was 0.66 g/dry, while *Phragmites australis* came in second place (0.41 g/dry). The consumed amounts of *Echinornia crassipes Gossypium* sp., *Pennisetum purpureum, Oryza sativa, Ipomoea batatas and Cyperus* sp. were 0.14%, 0.13%, 0.09%, 0.003, 0.002, 0.001 g/ dry, respectively.

Table 3: Host preferences of *Lemonia philopalus* larvae and its feeding consumption as areas and weights

Weeds and crop	Consumed food			Category
	cm²	g/wet	g/dry	
Phragmites australis	29.54	0.588	0.41	2
Ipomoea batatas	0.15	0.003	0.002	7
Echinornia crassipes	4.37	16.169	0.14	3
Pennisetum purpureum	5	0.001	0.09	5
Cyperus fuscus	2.40	0.2323	0.001	8
Gossypium sp.	5.71	0.1713	0.13	4
Zea mays	3.85	0.07315	0.66	1
Oryza sativa	2.68	0.6268	0.003	6

3. Biological studies on *Lemonia philopalus*

3.1.1 The larval stage

Table (4) summarizes the mean duration period in days of the larval stage of *L. philopalus and* the duration of each of the

six larval instars as determined under laboratory conditions. The duration of the different instars ranged between 2.46 and 7.2 days. The duration of the first instar was recorded at 2.46 days, and 5.4 days for the second instar, then gradually increased to 6.13, 6.93, and 7.2 days for the third, fourth, and fifth instars, respectively. The duration of the sixth instar was 6.53 days.

3.2. Duration of *Lemonia philopalus* pupal stage

The data presented in Table 4 shows the duration of the pupal stage and the adult stage. Results indicated that the pupal stage of *L. philopalus* lasted for 13 and 7.4 days for females and males, respectively, during 2003. While the records during 2004 were 13.33 and 7.75 for females and males, respectively.

3.3. Life span of *L. Philopalus,* under laboratory conditions.

Data in Table (4), indicated that the life span of *L. philopalus* was 56.89 days for females and 51.30 days for males. The pre-oviposition period was 2.58 days while, incubation period was represented by 9.08 days, and the larval stage reached 34.65 days. On the other hand, the pupal stage for females was recorded at 13.16 days and for males it was 7.57 days. However, the adult stage was represented by 4.50 days for females and 4.66 days for males. In this table, the incubation period, larval stage is represented by 34.65 days and the pupal stage is recorded at 13.16 and 7.57 days for males.

Table 4: Life span of *Lemonia philopalus* under laboratory conditions (24-26 c and 70- 75% RH).

Stage	(day)
Pre-oviposition	2.58 ±
Incubation period	9.08 ±
Larval stage	34.65 ±
Pupa stage	
Female	13.16 ±
Male	7.57 ±
Adult stage	
Female	4.50 ±
Male	4.66 ±
Total life spine	
Female	56.89 ±
Male	51.30 ±

4. Description of the different *L. philopalus* stages.

The egg is round and white with black patches, and it chorines the weeds, dry and Fig. (5 A).Larvae were large (6 cm) with a brownish body covered by hairs and having a gland sac and Fig. (5 B). The larvae are the harmful stage of this moth. Fig. (5C and 5D) present pupal stages and adult stages

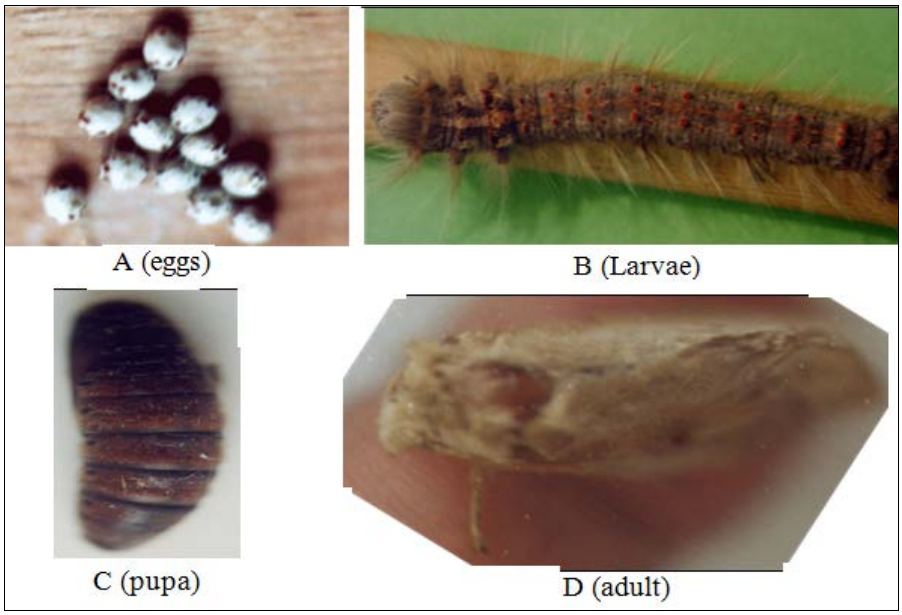

Fig 5: Different stages of *Lemonia philopalus* (Donz) egg, B. larvae, C. Pupa, D. adult) [3].

Indicated that *Phragmites* creates a reed bed attractive to other organisms due to tall and dense masses of its leafy stems. The strong vegetation of this weed provides a shelter to arthropods and small birds from bad wer ther and predators.

Conclusions

Females of *L. philopalus* laid their eggs on weeds, and their larvae attacked the common reed and caused considerable damage. It was observed that when the larvae of the insect stick the pre-oviposition period was 2.58 days, while the incubation period was represented by 9.08 days, and the larval stage reached 34.65 days. On the other hand, the pupil stage for females was recorded at 13.16 days and for males it was 7.57 days. A description of the different *Lemonia philopalus* stages. The egg is round and white with black patches, and it chorines the weeds on which it is laid. The larvae are the harmful stage of this moth. During the pupal stages and adult stages, the larvae attack plants, resulting in considerable damage, which is considered a biocontrol for weeds.

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