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Sesame webworm, *Antigastra catalaunalis* duponchel (Crambidae: Lepidoptera) survives on a new alternate host in Southern India

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Abstract
Sesame webworm, *Antigastra catalaunalis* Duponchel (Lepidoptera: Crambidae) feeds on tender foliage at the early stages of the crop by webbing the top leaves, and bores into flower buds and pods at maturity. Its infestation from seedling to maturity stage of the crop causes heavy yield loss. Sesame, being a seasonal crop, survival and development of *A. catalaunalis* on alternate hosts play a significant role in its perpetual predominance. Hence, a survey was conducted at Annamalai Nagar, Cuddalore district, Tamil Nadu state, Southern India during June to September 2014 and December 2014 to March 2015 to catalogue the alternate hosts of *A. catalaunalis*. During the survey, the weed plant, *Pedalium murex* Linn, commonly called large caltrops, was recorded for the first time as alternate host of *A. catalaunalis.* On *P. murex*, shoot damage to the tune of 13.66% was recorded whereas the capsules were undamaged. Further, to evaluate the role of *P. murex* on the pest, the biology of *A. catalaunalis* was studied using pot cultured plants of this novel host in comparison with the prime host, sesame. Larval tenure and adult longevity were found extended on *P. murex* than sesame. This indicates that *A. catalaunalis* survives successfully on *P. murex*.

Keywords: *Antigastra*, *Sesamum*, alternate host, *Pedalium*

1. Introduction
Webworm, *Antigastra catalaunalis* Duponchel (Lepidoptera: Crambidae) is the most serious pest on sesame throughout the world. In the early stage of the sesame crop, the larva webs top leaves and feeds within, whereas at maturity, it bores into the capsules and feeds on the contents [1]. Though its incidence on sesame was recorded throughout the crop period, scanty information was available regarding its survival and development during the off-season on other alternate hosts. Keeping this in view, a survey was conducted at Annamalai Nagar, Cuddalore district, in Tamil Nadu, India to identify the alternate hosts of *A. catalaunalis*. During the survey, the weed plant, *Pedalium murex* Linn. Was recorded for the first time as an alternate host for *A. catalaunalis*. Further, the natural incidence of *A. catalaunalis* on this alternate host and its influence on the biology of *A. catalaunalis* was studied in comparison with main host, *Sesamum indicum* L. and the results are presented hereunder.

2. Materials and Methods
2.1. Field survey to record the alternate hosts of *A. catalaunalis*
A preliminary random roving survey was conducted during February 2014 to March 2014 in and around Annamalai Nagar, Cuddalore district, Tamil Nadu state, Southern India, to catalogue the alternate host plants of *A. catalaunalis*, especially plants belonging to the family Pedaliaceae. During the preliminary survey, *P. murex* was found infested by *A. catalaunalis* at Sivapuri village (11°.24'N Latitude, 79°.41'E Longitude and 5.79 m. above mean sea level), in Cuddalore district of Tamil Nadu state in Southern India. Hence, the incidence of *A. catalaunalis* on *P. murex*, from the seedling stage to maturity was assessed during June 2014 to September 2014 (first season) and December 2014 to March 2015 (second season), when these plants were naturally growing in this region. *A. catalaunalis* incidence was assessed by counting total number of shoots and number of shoots damaged in each quadrate (1 m^2 area) and the mean per cent damage was computed. Five quadrates were randomly selected and observations were recorded at weekly intervals throughout the life period of the alternate host plant.

2.2. *In vitro* evaluation of development of *A. catalaunalis on S. indicum* and *P. murex*
Biology of *A. catalaunalis* on *P. murex* in comparison with sesame was studied on pot cultured plants at the Department of Entomology, Annamalai University, Tamil Nadu, India. Seeds of *P. murex* were collected from naturally grown plants and were sown in cement pots (30 cm dia and 30 cm high). Similarly, the sesame seeds were also sown in cement pots. The potting mixture comprising farmyard manure, red soil and sand in the ratio of 2:1:1 was used. Both *P. murex* and sesame plants were thus raised. To obtain the homogenous population of the webworm, field collected adults moths were released on seedlings of susceptible sesame cultivar 'SVPR 1' kept in plastic cages (45 cm tall) and were fed with 10 per cent sucrose solution through soaked cotton wigs. The adults were allowed to mate and lay eggs on the seedlings. The eggs were maintained at room temperature. After hatching of eggs, the neonates were released on 25-days old sesame and *P. murex* plants individually into a specially designed screening cage, which consisted of a cylinder (10.5 cm diameter and 25 cm long) made from a mylar film sheet with muslin and nylon mesh cloth affixed at either open end enclosing the foliage of the test plants. The cage was fixed to the top of a wooden stick (70 cm high). The larvae were allowed to grow without any

disturbance until pupation. The pupae along with silken cocoons were collected in small plastic cups having a layer of cotton and kept inside glass jars (15 cm high and 7.5 cm dia) and observed for adult emergence. The tenure of various life stages was recorded.

2.3. Statistical analysis
Percentage data were arcsine transformed and then subjected to analysis of variance [2] for calculating the critical difference by using the Agristat statistical software.

3. Results and Discussion
During first season, the survey was initiated from three leaf stage of *P. murex* plants (approximately 7 day after germination) which coincided with 25th standard week. Extensive leaf webbing and feeding was found on the late vegetative stage and the highest incidence (13.66 per cent shoot damage / quadrate) was recorded during the 31st standard week. Though *A. catalaunalis* infestation was noticed throughout plant period, its damage was reduced or nil during reproductive stage. In the second season, *A. catalaunalis* incidence was higher in fourth standard week (approximately 52 days after germination) and no damage was recorded during the reproductive phase of *P. murex* in both seasons (Table 1).

Biology of *A. catalaunalis* was found to be significantly influenced by both sesame and *P. murex*. The egg period was shorter in *P. murex* whereas larval period and adult longevity were slightly extended (Table 2).

Sustenance of major crop pests by alternate host plants during the off season will enhance their pestilence on target crops. Though newer alternate hosts of many pest species have been reported, the role of changing ecological niches needs to be evaluated. In this survey, *P. murex* was found to be an alternate host of *A. catalaunalis*, which is a maiden report.

P. murex, commonly known as large caltrops, is a shrub commonly found in tropical Africa, Sri Lanka, India, Mexico and Pakistan. In India, it is predominant along the western and Coromandel coasts [3], southern peninsular regions and Deccan Regions and in some parts of Sri Lanka [4]. Different parts of the plant are used to treat various ailments like cough, cold and as an antiseptic. *P. murex* is reported traditionally to have an excellent cure in patients with reproductive disorders which are mainly impotency in men, gonorrhoea as well as leucorrhoea in women. Because of its medicinal value, intensive and extensive cultivation of *P. murex* is currently practiced in many parts of southern India, which paves way for perpetuation of the pest permanently. Similarly, in Africa, the false sesame, *Ceratotheca sesamoides* Endl. (Family: Pedaliaceae) containing antiviral and aphrodisiac properties is reported to sustain the population of *A. catalaunalis* [5]. Many other wild species and weed plants such as *Sesamum prostratum* Retz., Flax seed, *Linaria* sp., *Martynia diandra* Glox., *Russelia juncea* Zucc. [6], common snapdragon, *Antirrhinum majus* Linn. [7, 8], *Tecoma stans* (L.) Juss. ex Kunth, *T. alata* Dc. and *T. capensis* (Thunb.) Lindl. [9] have already been reported as hosts of *A. catalaunalis.*

In sesame, *A. catalaunalis* infests and feeds on shoot, flowers and capsules, whereas in *P. murex*, they fed only the shoots not in flowers and pods. Flowers of *P. murex* contain quercetin [10], while the hard pods have vanillin which might deterred the feeding of *A. catalaunalis*. As the leaves sustain the survival, it is inferred that *P. murex* is an alternate host for *A. catalaunalis*.

Table 1: Incidence of *A. catalaunalis* on *P. murex*

S. No.	June to September 2014 (First season)		December 2014 to March 2015 (Second season)	
	Standard week	Mean percent shoot damage	Standard week	Mean percent shoot damage
1	25	1.05 (5.74)	49	0.78 (5.33)
2	26	0.56 (4.30)	50	1.01 (5.76)
3	27	6.21 (14.42)	51	4.95 (12.83)
4	28	2.23 (8.59)	52	1.99 (8.06)
5	29	3.34 (10.57)	1	3.34 (10.52)
6	30	1.91 (15.53)	2	7.33 (15.56)
7	31	13.66 (19.84)	3	5.98 (14.14)
8	32	2.58 (12.83)	4	10.74 (19.03)
9	33	1.65 (8.05)	5	2.84 (9.75)
10	34	1.58 (7.19)	6	1.33 (6.63)
11	35	0.44 (5.03)	7	0.82 (0.82)
12	36	0.12 (2.97)	8	1.17 (5.97)
13	37	0.10 (1.37)	9	0.84 (5.48)
14	38	0.00 (0.00)	10	0.02 (0.54)
15	-	-	11	0.00 (0.00)
16	-	-	12	0.00 (0.00)
S. Ed.		0.73		0.31
C.D. (P= 0.05)		1.50		0.64

Each value is mean of five replications
Values in parentheses are arcsine transformed

Table 2: Development of *A. catalaunalis* larvae on *P. murex* and *S. indicum*

Life stages	Tenure of life stages (days) on	
	S. indicum	***P. murex***
Egg incubation period	2.38 ± 0.05	2.15 ±0.07
Larval period	8.00 ± 0.14	10.25 ±0.08
Pupal period	4.47 ± 0.10	4.22 ± 0.05
Adult longevity	5.26 ± 0.08	5.45 ± 0.13
Total life cycle	20.11 ±0.17	22.07 ± 0.04

Each value is mean of five replications
Values followed by standard deviation

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