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First record of *Euthalia aconthea* (Lepidoptera: Nymphalidae), an important pest on Mango (*Mangifera indica*) from Jammu region

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Abstract
Detailed bionomics of *Euthalia aconthea* (Common baron fly) has been recorded for the first time in J&K on mango plantations. The insects were reared in the laboratory at temperature ranging between 24 °C-39 °C and relative humidity of 26%-80%. Caterpillars cause considerable damage to mango trees. There are five instar stages. Caterpillar of this butterfly while feeding on the mango trees took about 24-32 days to develop from first instar to mature larva. Larvae defoliate mango plants, reduce their vigour. Thus, an attempt was made to study the biology of this pest in Jammu as no earlier record of the pest has been obtained from the region so far. Biological studies include morphometric measurements of different stages from egg to adult. Larval period varies from 24 to 32 days. Pupal period ranges from 7.5 to 8 days (7.75±0.25days). Adult longevity is 8-12 days with an average of 10.00±1.50 days respectively. So far, no report is available on culture of *Euthalia aconthea*.

Keywords: *Euthalia aconthea*, *Mangifera indica*, biology, new.

Introduction
Mango (*Mangifera indica* L.) is known as "king of fruits". It belongs to family Anacardiaceae (Singh, 1968; Litz, 1997) [1, 3]. It is one of the most important trees on the earth and is now consumed worldwide. Mango is an important tropical fruit, which is being grown in more than 100 countries of the world (Sauco, 1997) [2]. But its original home is South Asia where it has been grown for the last four thousand years. It is an ancient fruit of Indo-Pakistan sub-continent and is of great importance for millions (Singh, 1968; Litz, 1997) [1, 3]. It is nutritionally rich in carbohydrates and vitamins A and C.
Euthalia aconthea is recorded as minor pest infesting mango plantations. It is one of the most destructive to mango plantations causing severe leaf damage to the mango trees in Jammu, India. Realizing the importance of the problem, detailed study of biology was taken into consideration.

Material and methods
Studies on the biology of *Euthalia aconthea* were conducted under laboratory conditions in the field laboratory in Jammu region from April to July during 2013-14. The insect larvae were collected from mango plantations of the area and reared in the laboratory. Authors fail to breed them in cage. So mating has been observed under natural field conditions. Each pair was observed for mating, pre-oviposition and oviposition behaviour and duration. Longevity of adults was also recorded. The butterflies have the characteristic feature of laying individual eggs. The egg was measured and their diameter was measured by means of an ocular micrometer after calibration. Egg was kept under laboratory conditions for incubation in Petri dishes.
Newly hatched larvae were then transferred to sterile paired petri dishes, lined with moist filter paper and provided with fresh mango leaves. The food and filter paper lining were changed after every third day during the first and second larval instars and later on food was changed daily and filter paper lining on alternate days. Larvae were observed daily and data was recorded with regards to moulting, duration and size of each larval instar, pupation and pupal period. All life stages were recorded morphometrically. Observations were recorded with regards to emergence and fecundity. Morphometric measurements were recorded using standard graphic paper method. For the study of different instars, the head capsule width was measured with the help of an occulometer. Data gathered during the experiment was analyzed statistically for calculating mean, standard deviation and standard error.

Results and discussions
Life cycle
Like other members of the order Lepidoptera, *Euthalia aconthea* goes through four growth stages: egg, larva, pupa and adult. The larval period is the longest, followed by pupal and incubation period.
Mating behavior and Oviposition behavior
Authors fail to breed them in cage. So mating has been observed under natural field conditions. It took place end to end and lasted for about 70-80 minutes. Mating occurs during flight mostly in the late morning hours.
The eggs are laid singly on both upper and under surface of the leaves. It lays 1-2 eggs in single cluth. The female chooses either fresh or older leaves for laying eggs as there was no bias for the age of the leaf. As the females were unable to mate and oviposit in captivity so the freshly laid eggs were collected from the field and brought in the laboratory.
Egg stage (Plate 1)
Gravid females lay eggs singly on the surface (either under or upperside) of the leaves of the mango. Each egg has a hemispherical shape with a base diameter of about 1.5-1.8 mm. the surface of the egg is covered with large hexagonal depressions with hair like protrubances emerging from adjoining corners. When freshly laid, the egg is light green in colour and later on as the egg matures it becomes darker in

colour. The egg measures1.6-2.0 mm in length with an average of 4.86±6.78 mm and width of 2-2.5 mm with an average of 2.75±0.25mm.

Incubation Period

Mature eggs turn dark green and incubation period lasts for about 4 to 5 days with an average of 4.43±0.42 days.

Hatching

From the incubated eggs, young larvae start hatching out on mango plantations (*Mangifera indica*). After hatching first instar larvae wander about and started feeding on upper surfaces of leaves forming small pe0rforations.

Larval Stages

The author has recorded five larval instars in the life cycle of the pest.

First Instar (Plate 1)

The first instar emerges after 4-5 days and proceeds to eat the eggshell as its first meal. The caterpillar is dark greenish in colour and has a pale yellowish brown head capsule. Body consists of ten pairs of long, yellowish and fleshly dorso latero protuberances. Green setae arise from the body. The first instar measured 4.5-7 mm with an average of 5.75±0.93mm and width of 1.5-2mm with an average of 1.75±0.25mm (Table 1). First instar lasted for 2.5-5 days with an average of 3.6±0.96 days (Table 2). Newly hatched larvae feed on upper surfaces of leaves forming small perforations.

Second instar (Plate 1)

The second instar larva is greenish in color. All the ten pairs of short protuberances have lengthened considerably. As the larva grows, white patches appear between all ten pairs of protuberances. Later on these patches become conjoined, forming a continuous dorsal band (which helps the larvae to blend in the surrounding when it rests on the midrib of a leaf). The second instar measured 10.5-14.5 mm in length with an average of 12.6±1.67mm and width of 2.5-3 mm with an average of 2.75±0.25mm (Table 1). Second instar lasted for 2.5- 4 days with an average of 3.2±0.570 days (Table 2). Larvae feed by defoliating the leaves along their margins.

Third instar (Plate 1)

The third instar caterpillar is also greenish in color and camouflage with the leaf. The branched spines arising out from body looks like a birds feather, with the secondary spines arranged properly around the main spine. As the larvae grow, pale purplish spots, one on each segment are embedded in the yellowish dorsal band. The third instar measured 18-20.0 mm with an average of 19±0.79 mm and width of 3-3.5mm with an average of 3.75±0.25 mm (Table 1). Second instar lasted for 3-4 days with an average of 3.43±0.42 days (Table 2).

Fourth instar (Plate 1)

The fourth instar caterpillar has similar appearance as in the 3rd instar. The embedded purplish spots in the dorsal band are now more distinguishable. The fourth instar measured 23-25 mm with an average of 23.8±0.85 mm and width of 3.5-4mm with an average of 4.75±0.25 mm (Table 1). Second instar lasted for 6-7 days with an average of 6.56±0.42days. (Table 2).

Fifth instar (Plate 1)

General appearance of the final instar larvae was similar to that of the fourth instar except variations in the length and width of the body that measured 29-33 mm with an average of 31±1.5mm and width of 4.5-5mm with an average of 5.75±0.25 (Table 1). Duration of fifth instar lasted for a minimum period of 10.0 days to a maximum of 12.0 days with an average of 11.0±0.79 days (Table 2). Besides its larger size, another feature which has a observable change is the embedded purplish spots in the dorsal band. These spots are now broader and more prominent in this final instar.

Average larval duration of the pest as recorded by the author in the study area on mango plantations as a host ranged between 24.0-32.0 days with an average of 27.8±3.34 days (Table 2).

Table 1: Morphometric measurements of different stages of *Euthalia aconthea*

Stage	Length(mm)		Width(mm)	
	Min-Max	**Mean±S.E**	**Min-Max**	**Mean±S.E**
Egg	1.6-2.0	4.86±6.78	2-2.5	2.75±0.25
First Instar	4.5-7.0	5.75±0.93	1.5-2	1.75±0.25
Second Instar	10.5-14.5	12.6±1.67	2.5-3	2.75±0.25
Third Instar	18-20.0	19±0.79	3-3.5	3.75±0.25
Fourth Instar	23-25	23.8±0.85	3.5-4	4.75±0.25
Fifth Instar	29-33	31±1.5	4.5-5	5.75±0.25
Pupa	18-20	19.0±0.79	8-9	8.43±0.42
Adult	26-28	27±0.79	58-60	59±0.79

Pupa (Plate 1)

Fully fed and matured larvae stopped feeding, body start shrinking and thickening in size. It then spins some silken threads around its body and remains in this pre-pupal stage for about 1.25±0.25days. It then seeks out a spot on the underside of a leaf. There it spins large quantity of silk threads to make a silk mound, to which its posterior claspers are then attached to. Later, the pre-pupa hangs from this anchor point in a head-down posture. By this time, the dorsal band has whitened entirely. After some time, a short transverse pale yellowish band appears on the dorsum about mid-body. Pupae almost naked, reddish brown with only a few strands of silken threads attached loosely to its body. The pupa measured 18-20 mm with an average of 19.0±0.79mm and width of 8-9mm with an average of 8.43±0.42mm. Pupal period ranged from 7.5 to 8 days with an average of 7.75±0.25days (Table 2).

Adult (Plate 1)

The adult is brownish in color with slight traces of olive. The antennae, head, thorax and abdomen are dark brown. The proboscis is lime green. The antenna is ochraceous at the tip. The forewing bears two transverse black lines at the base, a black loop is present one in the middle and another beyond apex of cell with their centres dark brown, followed by an angulated discal dark brown band bordered outwardly by a series of five white spots; two preapical white spots beyond and a broad, somewhat diffuse, subterminal black band broadening over the apex and angulated inwards in interspace. The hind wing is also dark brown and bears two crescent-shaped dark brown loop-like marks in cell; a discal series of dark brown, elongate, outwardly acute, inwardly diffuse, somewhat hastate spots, followed by a subterminal series of small spots of the same colour. The underside is ochraceous brown. On the underside, the wings are paler and have a submarginal series of black spots on both fore- and hindwings. The fore wing on the underside bears five transverse slender black lines across cell. The wing expanse is 68-79 mm.

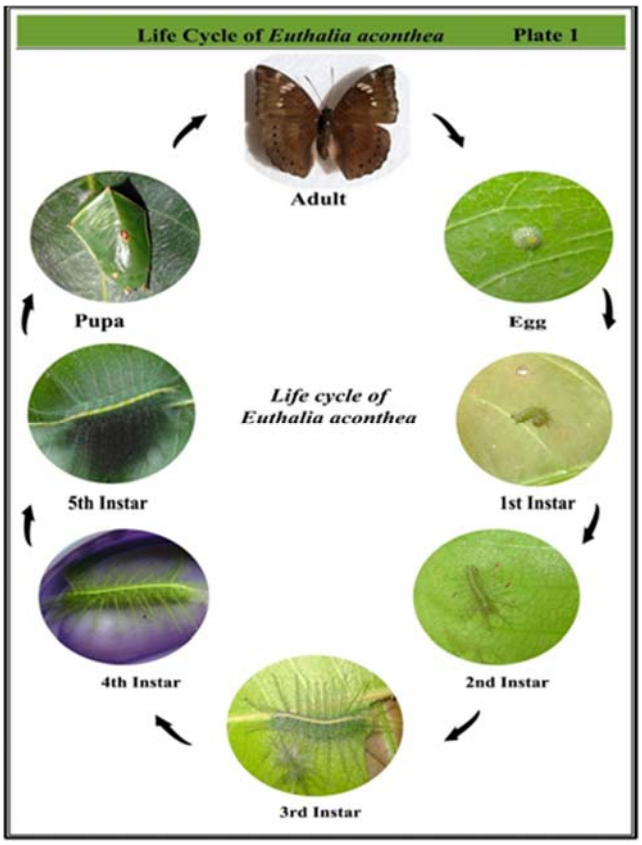
Damage

Euthalia aconthea is an important defoliator and a destructive pest of mango. Present investigations in Jammu division of J&K State on mango plantations as a host found the caterpillars of this pest defoliate the leaves and their feeding increases with

the subsequent instars and the caterpillars feed voraciously on the entire tender leaves including the veins. On the basis of above observations recorded by the author, *Euthalia aconthea* is recorded as an important minor pest of mango in Jammu province of J & K State. In the near future this pest may assume more serious and destructive position if adequate control measures were not undertaken immediately. This warrants attention of the orchardists of the region for its timely and proper control.

Table 2: Duration of different stages in the life cycle of *Euthalia aconthea*

Developmental stages	Duration (days)		Mean ±S.E
	Min	Max	
Incubation period	4	5	4.43±0.42
First Instar	2.5	5	3.6±0.96
Second Instar	2.5	4	3.2±0.570
Third Instar	3	4	3.43±0.42
Fourth Instar	6	7	6.56±0.42
Fifth Instar	10	12	11.0±0.79
Total Larval Period	24	32	27.8±3.34
Pupa	7.5	8	7.75±0.25
Total Life Cycle	35.5	43.5	39.08±2.90
Adult Longevity	8	12	10.00±1.50



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