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Life History of the Indian Palm Bob (*Suastus Gremius* Fabricius,1798) (Lepidoptera: Rhopalocera: Satyridae) From Southern Andhra Pradesh

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Abstract:

The life history of the Indian Palm Bob (*Suastus gremius* Fabricius,1798) in south India was studied on the basis of searches. The morphology of adults, eggs, larvae, and pupae were observed. Besides, the population index of *Suastus gremius* on *Phoenix acaulis* leaves was discussed. Life cycle completes in 29-31 days. The present study was carried out at Sri Lankamalleswara reserve forest (79° 07'–78° 80' E) and Kadapa (14° 47' N and 78° 82' E) during the calendar year 2016 -17 (January – December). Sri Lankamalleswara reserve forest has an average elevation of 138 meters (452 ft). The basic protocol for captive rearing was to collect eggs from wild-mated females, rear larvae to adult butterflies in captivity, and release adult butterflies and pupae back into wild populations. This butterfly normally requires a tropical to subtropical environment but sometimes ranges into sheltered, hot temperate areas.

Keywords: Seasonal, Indian Bob (*Suastus gremius*), life history, univalent, population index.

Classification: (https://en.wikipedia.org/wiki/*Suastus_gremius*)

Genus	Species	Sub-species	Wingspan of Adult Butterfly	Caterpillar Local Host Plants
Suastus Moore, 1881	*gremius* Fabricius, 1798	*gremius* Fabricius, 1798	33-35mm	*Cocos nucifera* (Arecaceae; common name: Coconut), *Rhapis excelsa* (Arecaceae, common name: Lady Palm).

INTRODUCTION

Butterflies offer nearly inexhaustible well of stimulating material for those who are curious in carrying out applied and pure research (Venkata Ramana *et al*, 2010).The need for conservation of insects are increasing with each year, and the butterflies are considered to be the important flag ships for insect conservation (Harinath *et al*, 2014, 2015). The rapid, bounding flight of these butterflies are given them their name (Kehimkar, 2008). In India the exact status of several species of butterflies are not clearly known and where there was accelerated distribution of forests and other natural areas giving to urbanization (Harinath et al., 2015, Venkata Ramana, 2011). The butterflies fly weak and fluttering near the ground and both sexes usually remain near their host plants. While most of these butterflies lay their dome-shaped eggs singly, some species lay eggs in batches (Venkata Ramana et al., 1996).The success of such efforts requires a sound knowledge of the biology and ecology of butterflies. But such information was largely deficient for Indian butterflies (Gay *et al*, 1992).We describe here the ovipositing resources of adults, different life cycle stages, population index, of Indian palm Bob *Suastus gremius* Fabricius.

MATERIALS AND METHODS

Study areas were searched for the reproductive activity of the *Suastus gremius* Fabricius was found laying eggs on *Phoenix acaulis* (Kunte, K. 2000). The eggs with the leaf material stages were brought to the laboratory and incubated and further development stages were recorded and the success rates of hatching, larval and pupal development was also recorded. Young leaves were supplied daily to growing larvae. Particulars of the larval, pupal stages and the time of adult emergence were recorded from close observations. Searches were made every month for recording the different life stages – egg, larvae, and pupae on 100 plants of *Phoenix acaulis* to work out the population index.

Oviposition host plants:
Suastus gremius fabricius largely located in places where damp places near streams and rivers and food plants are abundant (Kehimkar, 2008, Harinath et al., 2016). The *Suastus gremius* fabricius was easily distinguishable from other skippers by the pattern of black spots on the underside of the wings. Adults are found laying eggs mostly after the rainy seasons. The larvae are found in large number defoliating food plants. *Phoenix acaulis* serves both as a larval host plant and adult nectar host. It was also seen feeding on fishtailed palms (*Caryota urens*), Coconuts (*Cocos nucifera*). They feed mostly on *Phoenix acaulis* than fishtailed palms (*Caryota urens*) these species are recorded, but it utilizes other palms as well, including some ornamental species

Morphology:
Adult: *Suastus gremius* fabricius was dimorphic and the wings of the male are unmarked whereas female having two pale yellow crescentic spots on the hind wing. This is overall an uncommon butterfly. It was a prominent and narrows white to bluish white discal band partitioning the wing into an inner and an outer half. Its wing was pale brown sprinkled with grey scales and with five sharply defined, small, and black spots. The male having a discal stigma on the forewing. There are semi-transparent spots on the fore wings, the male and female are identical in appearance.

Physical Description of Adult Butterfly:
Above, the wings are brown with the forewing adorned with pale yellow hyaline spots in the cell-end and spaces 1b, 2, 3, 6, 7 and 8. The hind wing was unmarked. The tornal cilia are whitish. Beneath, the wings are grayish brown with the hind wing overlaid with buff scaling and featuring a number of moderately large and well defined black spots.

Field Observations of Butterfly Behavior:
The Palm Bob was common in Singapore. Sightings are rather frequent in nature reserves and in urban parks and gardens. The adults are fast flyers and are skittish when disturbed. They have been observed to visit flowers and sunbathe in sunny weather, and to puddle on bird dropping.

Early Stages:
Worldwide, a fair number of palm species have been recorded as larval host plants for the Palm Bob. The same was true in Singapore (butterflycircle.blogspot.in/2014/08/life-history-of-palm-bob.html), and two of them have so far been identified as the Coconut Palm and the Lady Palm. Both palm species are rather commonly cultivated in parks and gardens across the island. The caterpillars of the Palm Bob feed on the leaves of the host plant in all instars and live in leaf shelters constructed by cutting and folding leaf fragment on a palm frond. As the caterpillar grows in size later through progressing instars, it will abandon the current one and construct a larger one to accommodate its increased body size/length.

The eggs are laid singly on the upper surface of a leaf of the host plant. Each shallow dome-shaped egg was wine red with whitish longitudinal ridges emanating from the perimeter of the micropylar area sitting atop the egg. The eggs are rather large with a diameter of about 1.4mm.

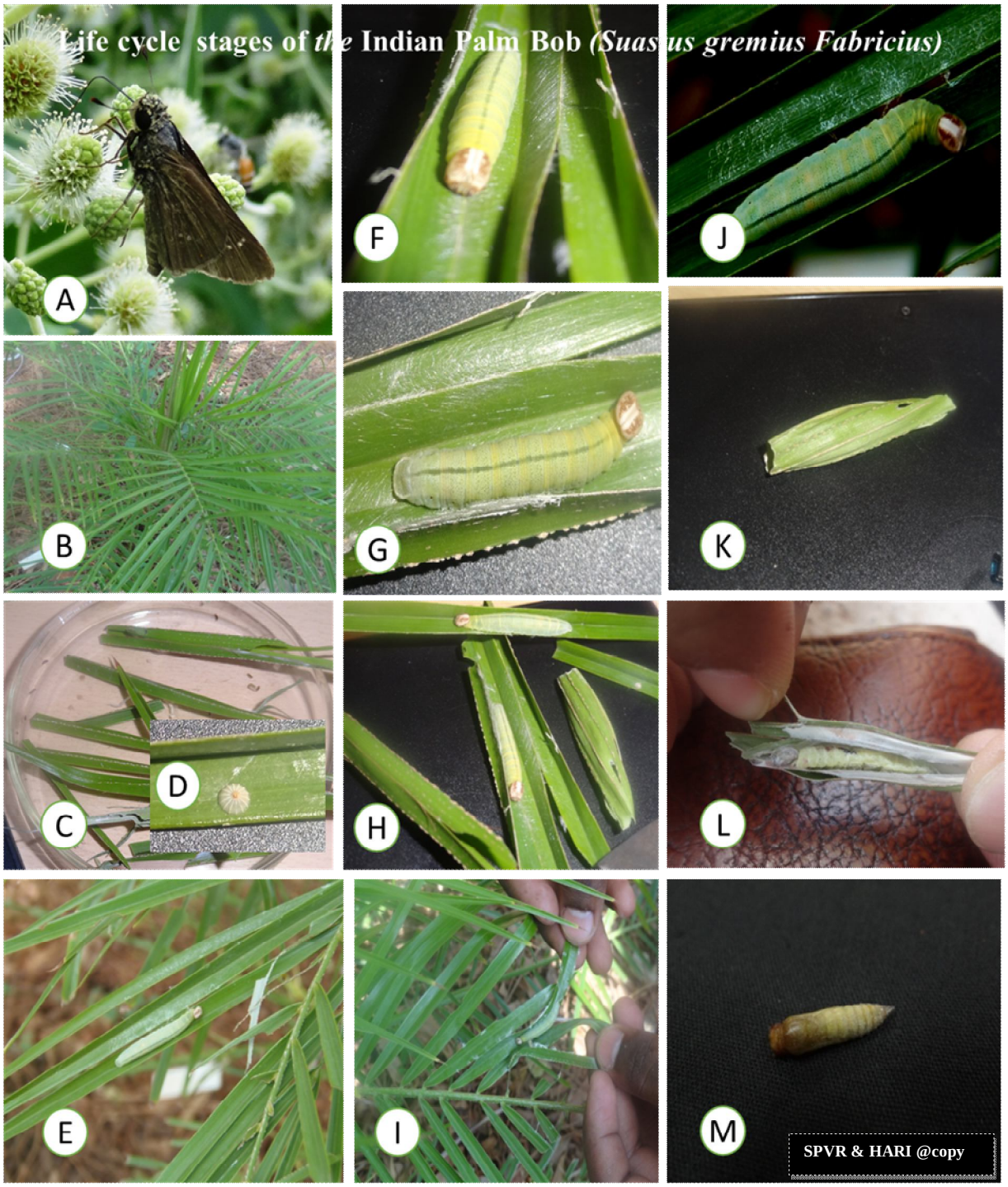
It takes about 4 days for the egg to hatch. The egg decolorizes to a dull shade of pinky brown when fully mature on the last day of this phase. The young caterpillar nibbles away just enough of the shell to emerge, but it makes only a feeble attempt to eat the remaining egg shell. The newly hatched has a length of about 3mm. It's bright orangy red body was cylindrical in shape and there was a tuft of moderately long setae on the posterior segment. Its head was in a bright shade of reddish brown.

LIFE HISTORY STAGES: (Figure 1)

Eggs: (4 days)
The eggs are laid singly on the upper surface of a leaf of the host plant. Each shallow dome-shaped egg was wine red with whitish longitudinal ridges emanating from the perimeter of the micropylar area sitting atop the egg. The eggs are rather large with a diameter of about 1.4mm. (butterflycircle.blogspot.in/2014/08/life-history-of-palm-bob.html)

1st Instar: (3-4 days)
After abandoning the empty egg shell, the newly hatched caterpillar constructs was first leaf shelter typically on the same leaflet of the palm frond. From the shelter, the caterpillar leaves the shelter periodically to feed on the nearby leaf lamina. The 1st instar takes a total of 3.5-4 days to complete with body length reaching about 6mm. (butterflycircle.blogspot.in/2014/08/life-history-of-palm-bob.html)

2nd Instar: (3 days)
The unmarked body of the 2nd instar caterpillar resembles that of the first instar at first but in a subdued tone of orange red for both body and the head capsule (which bears two obscure whitish stripes front). The stuff of moderately long setae was still present. The prominent anal plate was made of two semi-circular halves outlined in white. As the instar progresses, its body take on a strong greenish undertone, and gradually losing its reddish tone. This instar lasts a total of 3 days with the body length reaching up to 9mm.



A. Adult B. Host plant C, D. Egg E. Ist Instars F. II Instar G,H. III rd Instars I,J. IVth & Vth Instars L. Pre-Pupa M. Pupa

Figure 1: Photographs of the sequential stages in the life history stages of *Suastus gremius*

3rd Instar: (3 days)
The 3rd instar caterpillar resembles the 2nd instar caterpillar initially but soon loses all remaining traces of reddish tone in its body. For most of this instar, the body was pale yellowish with a greenish undertone. The head capsule takes on two additional whitish stripes which occur laterally, and the pale brown patches have small whitish spots embedded. This instar lasts about 3 days with the body length reaching up to 13mm.

4th Instar: (5 days)
The 4th instar caterpillar resembles the 3rd instar caterpillar closely but with minor differences. In the head capsule, both the white and brown coloration are now more intense, giving the head a more striking appearance. Another observable change was that the spiracles are now black in colour. This penultimate instar lasts about 5 days with the body length reaching up to 20mm.

5th Instar: (8-9 days)
The body of the 5th instar caterpillar was pale yellowish to whitish. The most prominent change from the 4th to the 5th takes place on the head capsule which has the brown coloration turned to black and with the whitish stripes expanded.

The 5th instar takes about 8-9 days to complete with the body length reaching up to 35mm. In the last 1-2 days of this instar, the underside of caterpillar starts to excrete some whitish powdery substance. Within the leaf shelter, a large number of silk threads are spun and a great mass of small whitish particles deposited. At this time, the body shrinks in length and its body colour changed to yellowish green. The shelter is rather tightly sealed as the caterpillar enter its preparatory phase which lasts for about 1.5 days. (butterflycircle.blogspot.in/2014/08/life-history-of-palm-bob.html)

Pupa: (8 days)
Pupation takes place within the leaf shelter. The pupa does not have a cremastral attachment nor a silk girdle and it was mainly secured with tightly woven silk threads in the shelter. It has a short thorax and a rather long abdomen. The body was darker green in the thorax and wing pad areas, but yellowish brown in the abdomen. The length of pupae: 19-20mm.

After 8 days, the pupa becomes mostly dark brown as the adult development stage within the pupal case comes to an end. Eclosion takes place the next day.

Duration of life cycle: The total development time from egg to adult emergence ranged between 29 – 31 [Egg: 4; Larva: 17-19; Pupa: 8] days.

Population index: (Fig.2)
The numerical frequency of the natural occurrence of the life stages – eggs, larvae, and pupae, on the host plant is given in figure- 1. All the stages could be spotted out during August to March, which corresponds post monsoon in the study locality. However, there was a higher frequency of occurrence of the life stages during September to November which corresponds with the post monsoon season.

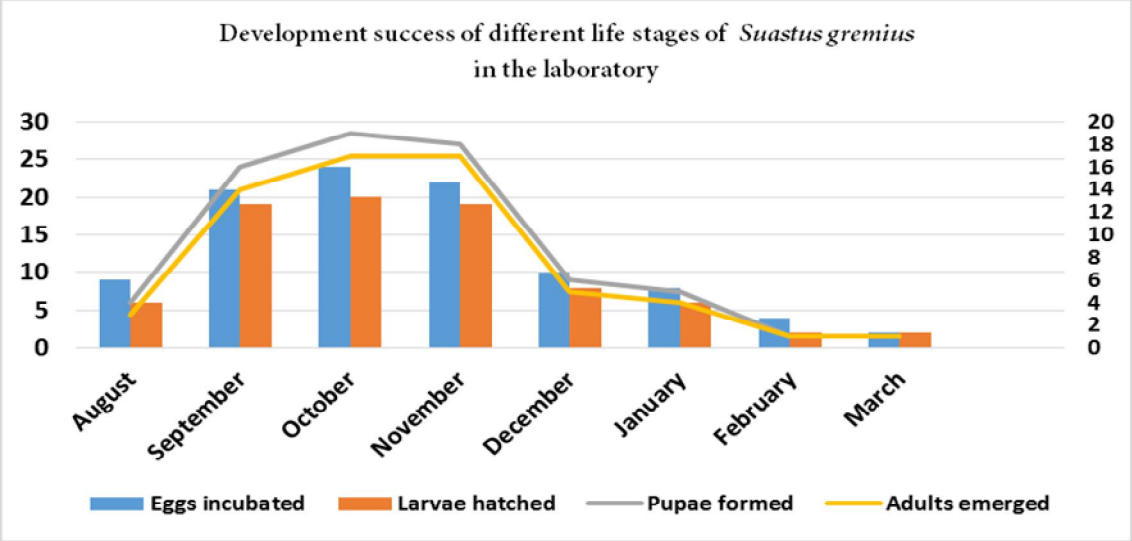


Fig. 2.Population index of eggs, larvae, pupae of *Suastus gremius* based on the searches of 100 *Phoenix acaulis* plants.

CONCLUSION

Development from egg to adult was completed in 29-31 days under laboratory conditions. The population index determined from the searches of 100 *Phoenix acaulis* plants shows that the eggs, larvae, and pupae are present throughout the year with a higher frequency during September - November (Fig. 2) was in line with the prediction of Owen (1971) that the tropical or sub-tropical butterflies breed throughout the year with better performance in a certain period of the year.

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