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LIFE CYCLE OF CITRUS BUTTERFLY *PAPILIO POLYTES* LINNAEUS (LEPIDOPTERA: PAPILIONIDAE) ON SWEET LEMON

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Introduction

The genus Citrus is unique in its diversity of forms and no other fruit crop can parallel it. Citrus crop possesses great adaptability to various climatic conditions and hence grown equally both in tropical and subtropical regions as well as some favorable parts of the temperate regions of the world. Citrus industry is the third largest, in the world after mango and banana. In India citrus crop occupies a prominent place covering an area of about 8.5 L ha with an annual production of 74.64 L tonnes with a productivity of 8.8 t/ha (NHB, 2011).

Citrus crop is being infested by around 165 species of economically important insect pests in India causing up to 30 per cent yield loss. In India about 250 species of insects have been found attacking and spoiling various citrus species. Among various insects citrus butterfly, *Papilio polytes* Linnaeus commonly known as the common mormon, has a successful dispersal and is a major economically important pest of citrus plants throughout Asia. *P. polytes* larvae feed on the foliage of citrus trees and are regarded as a major citrus pest especially in nurseries. The larval forms cause serious damage to citrus family by devouring large quantity of foliage during the later stages of their development, particularly in Southern and Southeast Asia.

The biology and developmental period is mainly dependant on the climate, location and plant species on which they are feeding. Information on the morphometric and biology of citrus butterfly on sweet lemon will be useful to evolve effective management strategy, against citrus butterfly. Here, the life cycle of the *Papilio polytes* (Papilionidae) is reported. The measurements of egg, larva, pupa and adult reported here are based on four samples and the samples were collected in Jalpaiguri district, West Bengal, India.

The different stages in the life cycle of *P. polytes*:

Egg stage : Eggs are spherical, smooth, cream-colored, and were laid on the under surface of sweet lemon (*Citrus limetta*). Its measurement was taken from the reference research papers.

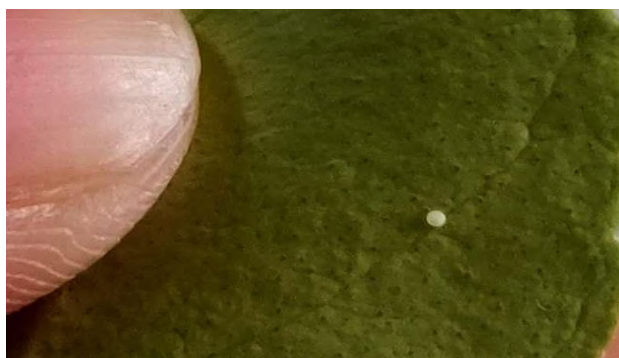


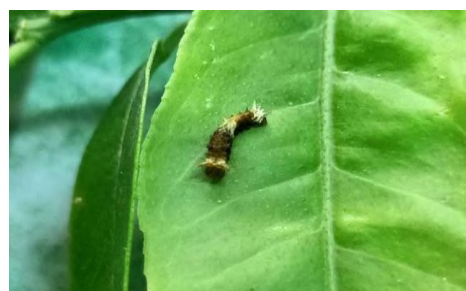
Fig 1 : Egg stage



Larval stage : The larvae were brown with a white strip and looked like bird dropping from 1st to 4th instar and were green in the 5th instar. Their lengths were measured with the help of scale and divider and were recorded. The larvae possess a “Y” shaped red structure called **osmeterium** which they take out when they feel threatened. During this process they emit a stinky smell. They have hypognathous head and biting and chewing mouth parts. They have three pairs of thoracic legs and four to five pairs of pseudo legs in the abdomen which look like spongy sticky pads. These pseudo legs help them to stick to a surface. Their body has abdominal segmentations and each of these segments contain a pair of pseudo leg. In the 5th instar larva, the ecdysial line which is inverted “Y” shaped could be seen prominently on the head. The pictures of different stages are given below.



1st instar larva



2nd instar larva



3rd instar larva



4th instar larva



5th instar larva



5th instar larva showing osmeterium



Ecdysial line in 5th instar larva

Photograph by: Aryaman Modak

Fig 2 : Different larval stages of citrus butterfly



Pupal stage : The pre-pupal stage and the pupal stages were observed carefully and the measurements of both the stages were recorded with the help of scale and divider.

In the pre-pupal stage the 5th instar larvae shrink and become “C” shaped and gets attached to a twig with the help of a web like structure.

In pupal stage, the larva forms pupa on the basis of their position on the twig. If the pupa is made on a twig where there are leaves around, then they form a green pupa, but if they form a pupa on a brownish twig which either has low foliage or is dead then they are likely to form a brownish pupa. This is a type of protective mechanism.

In the later stages of pupa i.e. before the emergence of butterfly, the pupa becomes translucent and the wing colour of the butterfly could be seen.



Early pre-pupal stage



Post pre-pupal stage



Early stages of pupa (Crysalis)



Later stages of pupa (Crysalis)

Photograph by: Aryaman Modak

Fig 3 : Pupal stages of citrus butterfly



Adult stage : The fully developed butterflies inside the pupal cases emerged out by splitting the case dorsally. Newly emerged adult butterflies were found to possess weak wings hence, were unable to fly for 45minutes to 1 hour. Later they started to fly. Adult butterflies were large and beautiful with wide wing spread. Their body could be divided prominently into head, thorax and abdomen. The thorax contained the three pairs of legs. The butterflies had capitates or club shaped antennae and had siphoning mouth parts.



Citrus Butterfly (*Papilio polytes*)

Photograph by: Aryaman Modak

Fig 4 : Adult stage of Citrus Butterfly (*Papilio polytes*)

Conclusion

The family Papilionidae is widely spread in every almost continent around the world except Antarctica. The butterflies of genus *Papilio* being an economically important pest is important as well as hazardous to the citrus industries globally including India.

This species is useful in many ways viz. - Pollination- Swallowtail butterfly benefits include their work as efficient pollinators. As they drink nectar from the flowers, they also pick up pollen, which they carry with them to other flowers. Deterring predators- Some species of *Papilio* deter other animals like birds, lizards from conquering the citrus orchards. Some of them taste bad, release foul odour, mimic other species which are non-desirable to predators, produce toxins etc. which ward off other unwanted pests in the orchard.

Besides these advantages, they are hazardous too. During their larval stage, they feed voraciously on the citrus leaves, mainly the young. This results in defoliation and decreased growth of the plant. As a result of this the fruiting of the plant is affected and the production per hectare decreases.

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