

Observations on the Leaf Roller, *Gangara thyrsis* Moore A Pest of Coconut Palm in India

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Abstract

Gangara thyrsis M. is one of the occasional pests of the seedling and young coconut palm in India. Maximum damage by this pest was recorded during July to October. Egg to adult period is completed in 37-52 days, with an egg, larval and pupal periods of 6-8, 21-32 and 10-12 days, respectively. The caterpillars are voracious feeders and the average consumption per caterpillar is 161.50 ± 3.62 sq. cm of lamina. *Elaeis guineensis*, *Rhapis flabelliformis* and *Chrysalidocarpus lutescens* were observed as additional hosts. The pest was also recorded on *Calamus rotang* in Kerala. Butterflies feed on nectar from flowers of *Catharanthus roseus* and *Leucas aspera*.

Introduction

Twelve species of hesperids (Order: Lepidoptera) have been reported as pests of coconut palm (Johnston, 1965; Kurian *et al.*, 1979). *Gangara thyrsis* Moore, *Suastrus gremiua* Fabricius and *Telicota palmarum* Moore are the species recorded from India (Nirula, 1955; FAO, 1964; Sathiamma *et al.* 1981).

Fletcher (1914) first reported *G. thyrsis* on coconut from

Tamil Nadu. Damage by this pest is usually confined to seedlings and young palms. The caterpillar rolls the margins of leaflets and construct tube-like leaf rolls. It hides inside the rolled leaf and feeds on the leaf lamina. Besides coconut, it also attacks other palms such as *Metoxylon*

(Leefmans, 1919); *Calamus rotang* (Susainathan, 1923; *Livistona*, *Roystonea* and *Nypa* (Corbetta 1932); *Arenga* (Lever, 1969); *Chamaerops fortunei*, *Kenthia artharia* and *Coreodoxa tegia* (Sivakumar *et al.*, 1975); canes (Beeson, 1941) and banana (Corbett, 1932; Lever, 1969).

The pest also occurs in the Far-East countries (Duport, 1913); Burma and Sri Lanka (Fletcher, 1919); Malaysia (Susainathan, 1923); Pakistan (FAO, 1964) and Thailand and Philippines (Lever, 1969). Brief life history of this pest was reported by various workers (Fletcher, 1914;

Corbett, 1932; Menon and Pandalai, 1958; Ayyar, 1963; Lever, 1969 and Child, 1974). The present paper describes the extent of damage, bionomics and detailed biology of *Gangara thyrsis*.

Materials & Methods

Observations of 1256 palms in the CPCRI farm in Kayangulam was made to assess the damage caused by this pest. The different life stages were reared on coconut seedlings and coconut leaflets under laboratory conditions at 26-32°C temperature and 72-78 per cent daily by using graph paper.

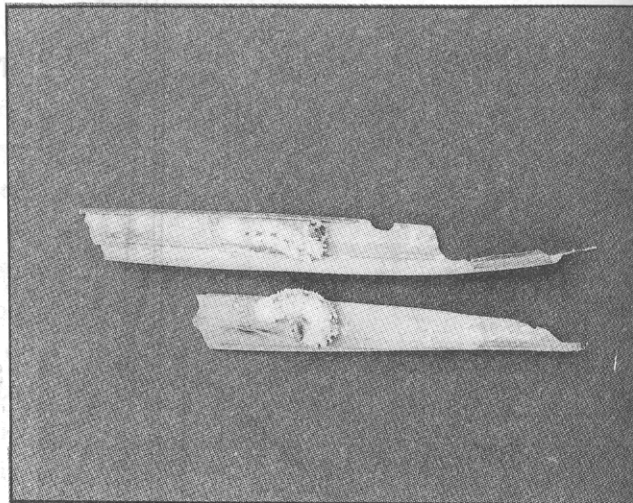


Fig. 1 Part of coconut leaflet showing larvae of *Gangara thyrsis*

Table 1. Leaf Consumption (sq. cm) of the Different Larval Instars of *Gangara thyrasis*.

Larval Instar	Mean \pm SE	Range
First	1.55 \pm 0.10	1.18 - 2.23
Second	3.67 \pm 0.56	2.24 - 7.45
Third	10.56 \pm 0.80	6.95 - 16.73
Fourth	23.33 \pm 3.28	11.60 - 40.08
Fifth	122.38 \pm 3.30	107.47 - 137.82
Average	161.50 \pm 3.62	143.82 - 175.74

Results and Discussion

Damage

Nearly 22 per cent of the observed palms up to five years of age were attacked by *G. thyrasis*. About 32 per cent of the fronds and 12 per cent of the leaflets were attacked. Most of the fronds showing injury were observed on the outer whorl of leaves. The caterpillars cut and eat the leaf lamina (Fig 1). The leaf consumption, under captivity, by the five larval instars is presented in Table 1. A larva consumes on an average 162 sq. cm of leaf per day.

Alternate Hosts

The oil palm, *Elaeis guineensis*; the ornamental palm *Rhapis flabelliformis* and the yellow areca palm, *Chrysalidocarpus lutescens* were also observed to be hosts of insect in Kerala and Karnataka. The rattan cane, *Calamus rotang* hosted *G. thyrasis* in Kerala also. The pest can complete its life cycle on these host plants. Butterflies feed on nectar from flowers of *Catharanthus roseus* and *Leucas aspera*, which grow as weeds in the coconut plantations.

Life History

Table 2 gives the duration of the egg to adult stages and table 3 shows the measurements of the different stages. Egg to adult period ranges from 37 to 52 days.

Egg: Eggs are laid singly, irregularly scattered on the dorsal surface of the leaflets. Egg is pale white in colour with fine radial striations. It is hemispherical in shape with a central apical depression and a flat transparent bottom stuck to the leaf surface. Egg measures 2.0 ± 0.1 (range

1.8-2.2)mm in diameter. Eclosion takes place by the dehiscence of the egg-shell on one side. The average egg viability is 61.0 ± 4.9 per cent (range 36-78 per cent). Egg hatches in 6-8 days.

Larvae: Caterpillar is smooth, elongate, cylindrical and tapering anteriorly and posteriorly. Head is large and hemispherical. Width of the head capsule of the five larval instars is presented in Table 4. Body is slightly flattened, pale green, and with dense mass of white waxy material. Five larval instars are completed within 21 to 32 days.

The first instar larva has black head, pale green body and a dorsal black scar on the prothorax. Soon after eclosion the larva feeds on the calcareous egg shell. Gradually, it starts feeding on the leaf lamina and constructs a leaf fold. In the second instar larva, whitish waxy powder appears in patches on the lateral sides of the body 24 hours after moulting. In the third instar larva the waxy coating spreads all over the head and body also forming thread like structures. Paired red

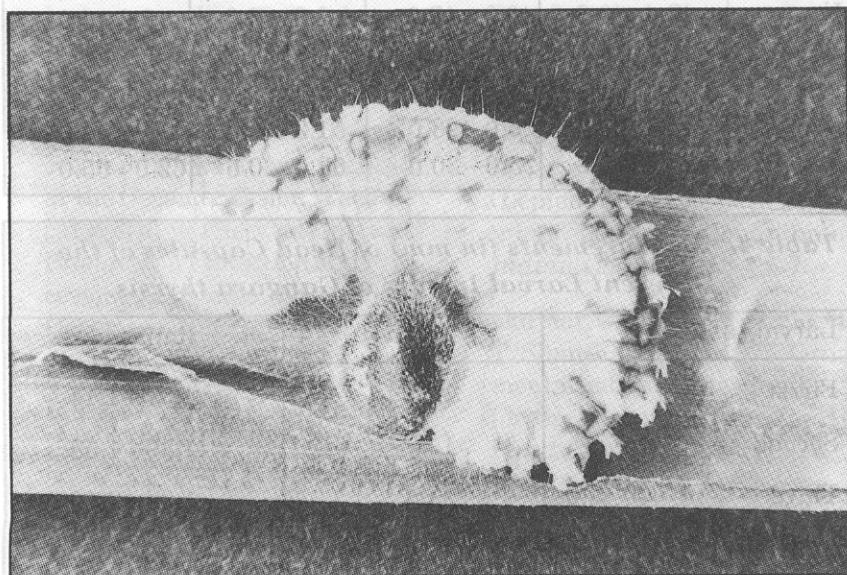


Fig. 2 Late instar larvae of *Gangara thyrasis* showing waxy coating on the body

Table 2. Duration (days) of the Different Stages of *Gangara thyrsis*.

Duration	Mean \pm SE	Range
Egg period	7.0 \pm 0.2	6 - 8
Larval period		
First Instar	3.1 \pm 0.2	2 - 4
Second	4.1 \pm 0.2	3 - 5
Third	4.3 \pm 0.3	3 - 6
Fourth	6.3 \pm 0.3	5 - 7
Fifth	8.8 \pm 3.30	8 - 10
Pupal period	10.6 \pm 0.2	10 - 12
Adult longevity		
Male	9.5 \pm 0.7	7 - 14
Female	10.5 \pm 0.8	7 - 15

Table 3. Measurements (in mm) of the Life Stages of *Gangara thyrsis*.

Stage	Length		Width	
	Mean	Range	Mean	Range
Larva				
I	8.5 + 0.2	7.0 - 9.0	1.5 + 0.1	1.0 - 2.0
II	11.7 + 0.3	10.0 - 13.5	2.0 + 0.1	1.3 - 2.5
III	17.6 + 0.5	16.0 - 20.0	3.2 + 0.2	3.0 - 5.0
IV	27.8 + 0.7	24.0 - 30.0	5.1 + 0.3	4.0 - 6.0
V	42.4 + 0.8	40.0 - 47.0	8.0 + 0.3	6.0 - 9.0
Pupa	31.1 + 0.3	30.0 - 32.0	7.6 + 0.2	7.0 - 8.5
Adult				
Male	26.5 + 0.3	26.0 - 28.0	51.3 + 0.7	48.0 - 52.0
Female	29.3 + 0.2	28.0 - 30.0	63.7 + 0.6	62.0 - 65.0

Table 4. Measurements (in mm) of Head Capsules of the Different Larval Instars of *Gangara thyrsis*.

Larval Instar	Mean	Range
First	1.11	1.07 - 1.14
Second	1.47	1.30 - 1.58
Third	2.05	1.86 - 2.16
Fourth	3.00	2.85 - 3.20
Fifth	4.47	4.25 - 4.65

spots appear dorsally on the sixth abdominal segment at this stage, which in the fourth instar larva forms a red mid-dorsal line bordered by white dots. Waxy coating with long thickly set threads covers the entire body of the fourth and fifth instar larvae (Fig 2). The last larval instar is a voracious feeder. It can consume the entire leaf blade leaving only the midrib. The larval stage ends in a pre-pupal phase lasting from 1-2 days. At this stage, the active larva becomes sluggish, stops feeding and closes the larval chamber, Body gets reduced in size and the waxy coating gradually disappears. The prepupa moults and enters the pupal stage.

Pupa: Pupa is greenish-white, almost cylindrical tapering posteriorly and terminating in a spine-like process. Pupa hangs with the head downwards inside the cocoon, the posterior end of which is attached to the inner side of the leaf roll. When disturbed, the pupa strikes against the innerside of the leafroll and produces a rattling sound. Pupal period lasts from 10-12 days.

Adult (Fig 3): Butterfly has brown body with chocolate brown wings. Forewing bears six yellow spots. No mating was observed during day time. Fecundity was 13.8 ± 1.6 (range 8-21) eggs under captivity. Butterflies are commonly observed during July to October in Kerala when they are seen flying near coconut seedlings.

Menon and Pandalai (1958) and Lever (1969) reported an incubation period of about 7 days, larval period of about 35 days and pupal period of about 10 days. The present observations revealed that the egg period ranged from



Fig. 3 *Gangara thyrasis* adult

6-8, larval period 21-32 and pupal period 10-12 days.

Summary

Caterpillar of *Gangara thyrasis* is one of the occasional defoliator pests of coconut palm in India. It causes damage to seedlings and young palms. Attack is prevalent during July to October. Egg to adult period ranges from 37-52 days with an egg, larval and pupal periods of 6-8, 21-32 and 10-12 days, respectively. On an average, a single caterpillar consumes 161.50 ± 3.62 sq. cm of leaf within its larval period. *Elaeis guineensis*, *Rhapis flabelliformis* and *Chrysalidocarpus lutescens* were observed as additional alternate hosts.

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