

First record, biology and seasonal abundance of *Phycodes minor* Moore (Lepidoptera: Brachodidae) on *Ficus palmata* Forssk in Saharanpur, Uttar Pradesh, India

Om Datta

Department of Zoology, Maharaj Singh College, Saharanpur, Uttar Pradesh, India

Corresponding author: Om Datta

Received 13 Aug 2025; Accepted 29 Sep 2025; Published 10 Oct 2025

DOI: <https://doi.org/10.64171/JAE.5.4.22-25>

Abstract

Phycodes minor Moore is a sporadic pest of *Ficus palmata* Forssk in the Saharanpur district of Western Uttar Pradesh. The fecundity of the females was recorded to be 68.92 ± 21.04 eggs per female, while the incubation period averaged 4.75 ± 0.12 days. The study identified five larval instars, with a mean duration of 32.25 ± 1.35 days. The recorded durations for the pre-pupal period, pupal period, and adult period were 3.71 ± 0.98 days, 9.3 ± 1.68 days, and between 3.7 and 10.23 days, respectively. Additionally, the pre-oviposition, oviposition, and post-oviposition periods were observed to last for 5.12 ± 1.19 days, 2.45 ± 0.71 days, and 1.45 ± 0.68 days, respectively. The total life cycle from egg to adult, including the longevity of the adults, was completed in 46.3 ± 0.59 days. The lifespans of adult males and females were recorded to be 5.8 ± 1.03 days and 9.7 ± 1.82 days, respectively. *P. minor* first appeared in the month of March and remained active until October. The larval population was observed to be higher in May, July, August, and September, but it declined in October. The population of *P. minor* was recorded to be nil in the months of January, February, November, and December. The larvae of *P. minor* caused leaf damage ranging from $2.51 \pm 0.76\%$ to $6.31 \pm 0.81\%$ per plant from March to October in 2023, while in 2024, the damage observed was between $2.92 \pm 0.72\%$ and $6.89 \pm 0.76\%$ per plant. Generally, a single larva was found in each rolled leaf tunnel, and 1 to 2 tunnels were observed on an infested leaf. A review of the available literature indicates that although *P. minor* has been previously reported on *Ficus religiosa* (peepal) and *Ficus palmata* (wild fig) from various parts of India, yet this is the first documented record of its occurrence on *Ficus palmata* in Saharanpur.

Keywords: Leaf roller, Biological parameters, Seasonal occurrence

Introduction

Phycodes minor (Lepidoptera: Brachodidae) is a fig leaf roller moth belonging to the family Brachodidae. It was first described by Frederic Moore in 1881 and is found in regions of South and Southeast Asia (Kallies, 2004). It has been reported as a minor and sporadic pest of fig from Burma, Sri Lanka and India (Fletcher, 1917 and Wadhi and Batra, 1964) [1, 6]. The genus *Phycodes* comprises day-flying moths whose larvae roll the fig leaves. In district Saharanpur specific field study was focused entirely on *P. radiata* on other fig species, without addressing *P. minor* (Datta, 2024) [2]. The larvae of *P. minor* are leaf rollers; they create shelters by folding and tying leaves together with silk thread and feed on the mesophyll tissue of the leaves, leaving only the upper epidermis intact, which causes the leaves to turn yellow and eventually dry out. *Ficus palmata*, also known as the wild Himalayan fig or Punjab fig, is a wild fig species native to the Himalayan region and other parts of Asia. It's a deciduous tree or shrub, reaching up to 10 meters tall. The plant is well-adapted to seasonally dry tropical biomes, including desert and dry shrubland areas, and is often found near villages and wastelands, fields etc. The fruits are edible and are a good source of minerals and vitamins. The *figus palmata* is of immense medicinal value as it is used to treat various diseases, e.g. gastrointestinal disorders, hypoglycemia, tumor, ulcer, diabetes, hyperlipidemia and fungal infections (Joshi et al., 2014) [5]. The fruits are used

in folk medicine for treating inflammation, pathogenic bacterial ailments and be used as an analgesic (Shi et al. 2014) [3]. The plant attacked by several insect pests including leaf rollers, fig moths, thrips, and scale insects. Among them *P. minor* is an important and notable pest which damages the plant's leaves. This study aims to describe the new record of *P. minor* and its seasonal occurrence from Saharanpur district of Western Uttar Pradesh.

Classification

Kingdom: Animalia

Phylum: Arthropoda

Class: Insecta

Order: Lepidoptera

Family: Brachodidae

Genus: *Phycodes*

Species: *minor*

Scientific name: *Phycodes minor*

Materials and Methods

The field surveys were conducted during the year 2023-2024 in rural and urban areas of Janta and Dehradun Road, Saharanpur ($29^{\circ}50' - 30^{\circ}05'N$ latitude and $77^{\circ}30' - 77^{\circ}40'E$ longitude) where the *Ficus palmata* plants were present abundantly in wild. During survey, the *F. palmata* plants were

found to be heavily infested in the form of rolled leaves. These rolled leaves were open and a kind of lepidopteran larva was found within the leaves. Fifty infested leaves of *F. palmata* containing the larval stage were collected and reared separately in glass tubes (10cmx2.5cm) on fresh leaves of *F. palmata* up to adult (25 ± 2 and R.H. $70 \pm 5.0\%$) in the research laboratory of the Department of Zoology, Maharaj Singh College, Saharanpur, U.P., India. The adults were identified as *P. minor* Moor. Incubation period of the eggs and the durations of larvae, pupae and adults were measured periodically.

Field observations and data collection

Ten infested plants of *F. palmata* were observed in the field from March to October in order to document the seasonal abundance, percentage of infestation, mode of feeding, and leaf damage. The population of larvae was observed monthly and counted as number of larvae per plant. The number of larvae and the extent of damage on each plant were assessed monthly through the inspection of rolled and damaged leaves. Meteorological data, including temperature, humidity, and rainfall, were obtained from the Horticulture Research Institute in Saharanpur, Uttar Pradesh, to analyze the impact of these abiotic factors on the population dynamics of *P. minor* Moor.

Results and Discussion

The findings of the present study revealed that the female moth laid 68.92 ± 21.04 eggs, either singly or in clusters of 2–15, on both surfaces of the leaves, generally along the margins. The mean incubation period of the pest was 4.75 ± 0.11 days, which closely agrees with the observations of Simwat and Sidhu (1974)^[4], who reported an incubation period varied from 4.74–5.94 days. The newly hatched larvae fed gregariously on the lower surface of the leaves within a silken web spun by them, while from the second instar onward, the larvae dispersed and constructed individual webs on either side of the leaves. In the present investigation, the total larval duration was recorded as 32.25 ± 1.35 days, which is comparable to the results of Simwat and Sidhu (1974)^[4], who reported a duration of 30.60–35.87 days in Punjab on *Ficus carica*. The mature larva (Fig. 1) pupated inside a silken cocoon (Fig. 2). The mean pre-pupal and pupal stages (Fig. 3) lasted for 3.71 ± 0.98 days and 9.3 ± 1.68 days, respectively, which are in close conformity with the findings of Simwat and Sidhu (1974)^[4], who recorded the respective durations of 3.72 days and 8.37–10.66 days, respectively, on *Ficus carica* in Punjab. The pre-oviposition, oviposition, and post-oviposition periods were observed to last 5.12 ± 1.19 , 2.45 ± 0.71 , and 1.45 ± 0.68 days, respectively, which also corroborate the values reported by Simwat and Sidhu (1974)^[4] (5.14 ± 1.09 , 2.43 ± 0.68 , and 1.43 ± 0.48 days, respectively). The longevity of adult moths ranged from 3.6 to 10.57 days (Table 1). The total life cycle from egg to adult was completed in 46.3 ± 0.59 days. The adult male and female lived for a period of 5.8 ± 1.03 and 9.7 ± 1.82 days respectively.

Seasonal abundance

The seasonal abundance of *P. minor* was observed on *Ficus palmata* (Fig. 5), with all plants being approximately the same

size, from March to October in the years 2023 and 2024 in the Saharanpur district of Uttar Pradesh. The infestation was first documented in the initial week of March. In March, the total larval population was recorded to be 4.3 ± 0.99 larvae per plant, accompanied by $2.51 \pm 0.76\%$ leaf damage in 2023. In 2024, the population increased to 4.5 ± 0.95 larvae per plant, with $2.92 \pm 0.72\%$ leaf damage per plant, indicating a slight rise compared to the previous year. In April, the larval population slightly increased to 6.6 ± 0.51 larvae per plant, accompanied by $4.32 \pm 0.57\%$ leaf damage per plant in 2023. In the following year, 2024, the population was recorded at 6.7 ± 0.52 larvae per plant, with $4.37 \pm 0.59\%$ leaf damage per plant. In May, the larval population of *P. minor* was noted to be 7.2 ± 0.78 larvae per plant, resulting in $4.71 \pm 0.89\%$ leaf damage in 2023, whereas in 2024, it was recorded at 7.4 ± 0.76 larvae per plant, with $4.97 \pm 0.95\%$ leaf damage per plant. In the month of June, the larval population slightly decreased in both years and was observed to be 5.3 ± 0.67 larvae/plant, causing $3.11 \pm 0.67\%$ leaf damage/plant during the year 2023 and 5.5 ± 0.68 larvae/plant with $3.65 \pm 0.76\%$ leaf damage/plant in 2024. The population of *P. minor* larvae was increased again in July and recorded to be 8.3 ± 0.67 larvae/plant with $5.62 \pm 0.75\%$ leaf damage/plant in 2023, whereas it was observed to be 8.6 ± 0.67 larvae/plant with $5.76 \pm 0.78\%$ leaf damage/plant during the year 2024. In the month of August, the larval population was recorded to be 8.7 ± 0.48 larvae/plant with $5.66 \pm 0.77\%$ leaf damage/plant during the year 2023 and 8.9 ± 0.76 larvae/plant causing $6.13 \pm 0.82\%$ leaf damage/plant in 2024. The population significantly increased in September, attaining 8.9 ± 0.47 larvae per plant, resulting in $6.31 \pm 0.81\%$ leaf damage per plant in 2023, whereas in 2024, it was recorded at 9.2 ± 0.67 larvae per plant with $6.89 \pm 0.76\%$ leaf damage per plant. The larval population of *P. minor* exhibited a gradual decline in October, recorded at 3.1 ± 0.56 larvae per plant with $1.95 \pm 0.61\%$ leaf damage per plant in 2023, compared to 3.6 ± 0.57 larvae per plant with $1.98 \pm 0.67\%$ leaf damage per plant in 2024 (Table 2). The population of the pest *P. minor* was recorded as zero in November, December, January, and February due to the decline in temperature and precipitation. The pest was active solely from March to October. Similarly, Simwat and Sidhu (1974)^[4] also recorded the presence of *P. minor* from March to September in Punjab, which supports our findings. Further, Sidhu et al. (2013) reported *P. minor* on *F. palmata* and *F. religiosa* in the Punjab and Himachal regions. Temperature, humidity, and precipitation significantly influence the fluctuations in insect populations. The maximum temperature is positively and significantly correlated with population abundance and plant growth, particularly in new foliage development, whereas heavy rainfall is negatively correlated with insect population decline. Young leaves are essential for the population increase of insects, as they are crucial for egg-laying females and for the nourishment of larval stages (Datta, 2024)^[2].

Nature of feeding and extent of damage to the plant

The larvae of *P. minor* are leaf rollers that fold the leaf margin and consume leaf tissue. They consume mesophyll tissue while

preserving the upper epidermis, resulting in chlorosis and ultimately desiccation of the affected leaves. The larvae construct webs on the leaves using silken threads and consume the foliage from within the leaf tunnel. This damage can result in significant defoliation, especially during peak infestation

periods. In our study, we recorded 15 to 35 (25.5 ± 8.31) larval infestations per plant and 12 to 31 percent (22.00 ± 6.44) damage per leaf. Generally, a solitary larva was observed in each tunnel, with 1 to 2 tunnels recorded on an infested leaf.

Table 1: Biological parameters of *Phycodes minor* on *Ficus palmata* from Saharanpur, Uttar Pradesh

S. N.	Biological parameters	Duration in days	Hatching percentage of the eggs
1	Egg period	4.75 ± 0.12 (4.74 to 5.94)	-
2	Total larval period	32.25 ± 1.35	-
3	Pre-pupal period	3.71 ± 0.98	-
4	Pupal period	9.3 ± 1.68	-
5	Longevity of adult male	5.8 ± 1.03	-
6	Longevity of adult female	9.7 ± 1.82	-
7	Pre-oviposition period	5.12 ± 1.19	-
8	Oviposition period	2.45 ± 0.71	-
9	Post oviposition period	1.45 ± 0.68	-
10	Fecundity (No of eggs/ female) Hatchability (%)	68.92 ± 21.04	65%
11	Total life cycle	46.3 ± 0.59	-

Table 2: Seasonal abundance of *Phycodes minor* on *Ficus palmata* in Saharanpur, Uttar Pradesh

Seasonal occurrence of <i>Phycodes minor</i> during the year-2023					
Month	No of larvae	Percentage of leaf damage/plant	Mean temp. values ($^{\circ}\text{C}$)	Rainfall (in mm)	Relative humidity (in %)
January	-	-	-	-	-
February	-	-	-	-	-
March	4.3 ± 0.99	2.51 ± 0.76	25.96 ± 2.92	42.90	20.96 ± 5.35
April	6.6 ± 0.51	4.32 ± 0.57	33.7 ± 2.40	26.4	28.16 ± 6.25
May	7.2 ± 0.78	4.71 ± 0.89	37.06 ± 2.97	48.18	22.70 ± 9.45
June	5.3 ± 0.67	3.11 ± 0.67	34.23 ± 2.84	94.70	33.13 ± 8.89
July	8.3 ± 0.67	5.62 ± 0.75	30.29 ± 2.12	415.62	52.32 ± 11.38
August	8.7 ± 0.48	5.66 ± 0.77	29.32 ± 2.18	354.25	74.32 ± 9.33
September	8.9 ± 0.47	6.31 ± 0.81	28.40 ± 1.10	208.39	62.28 ± 9.26
October	3.1 ± 0.56	1.95 ± 0.61	25.67 ± 1.46	16.49	60.83 ± 9.30
November	-	-	-	-	-
December	-	-	-	-	-
Seasonal occurrence of <i>Phycodes minor</i> during the year-2024					
January	-	-	-	-	-
February	-	-	-	-	-
March	4.5 ± 0.95	2.92 ± 0.72	23.94 ± 2.62	40.85	30.41 ± 3.40
April	6.7 ± 0.52	4.37 ± 0.59	30.71 ± 2.12	27.39	32.90 ± 6.27
May	7.4 ± 0.76	4.97 ± 0.95	36.32 ± 2.86	50.34	33.90 ± 9.63
June	5.5 ± 0.68	3.65 ± 0.76	39.35 ± 2.25	95.70	30.22 ± 7.79
July	8.6 ± 0.67	5.76 ± 0.78	34.15 ± 3.34	430.45	55.56 ± 11.21
August	8.9 ± 0.76	6.13 ± 0.82	30.41 ± 2.31	370.19	76.90 ± 8.42
September	9.2 ± 0.67	6.89 ± 0.76	29.50 ± 1.32	210.75	63.25 ± 8.29
October	3.6 ± 0.57	1.98 ± 0.67	26.47 ± 1.55	20.51	61.81 ± 8.45
November	-	-	-	-	-
December	-	-	-	-	-



Fig: (1) Larva of *Phycodes minor* (2) Cocoon (3) Pupae (4) Adult (5) Host plant *Ficus palmata* (6) Infested leaf of *Ficus palmate* (Magnification -1xzoom-1:1magnification)

Conclusion

The study concludes that *P. minor* Moore is a confirmed leaf-rolling pest on *F. palmata* in Saharanpur. However, published literature contains no direct surveys or phenological data for this species. The active period of *P. minor* was observed from March to October during the year 2023–2024. The peak population of the pest was recorded in the months of July to September and nil during winters from November to February during both years.

Acknowledgements

The author expresses gratitude to Dr. Amit Dhiman (Assistant Professor, Department of Botany, Purnamal Degree College, Gangoh, Saharanpur) for his assistance in identifying the host plants, Dr. S.C. Dhiman (Former Professor and Head, Department of Zoology, Maharaj Singh College, Saharanpur) for scientific discussions during the study, and Joint Director, HRI and Training Center, Saharanpur, for providing meteorological data.

References

1. Fletcher TB. Fruit trees: fig (*Ficus carica*). In: *Proceedings of the Second Entomological Meeting, Pusa*, 1917, 250-251.
2. Datta O. Seasonal occurrence and damage caused by *Phycodes radiata* Ochseneheimer (Lepidoptera: Brachodidae) on *Ficus* spp. in Uttar Pradesh, India. *Entomon*. 2024;49(1):141-146.
3. Shi Y, Hu H, Xu Y, Liu A. An ethnobotanical study of the less known wild edible figs (genus *Ficus*) native to Xishuangbanna, Southwest China. *J Ethnobiol Ethnomed*. 2014;10(1):68.
4. Simwat GS, Sidhu AS. Biology of the fig leaf roller, *Phycodes minor* Moore (Glyphipterygidae: Lepidoptera). *Indian J Entomol*. 1974;36(2):149-150.
5. Joshi Y, Joshi AK, Prasad N, Juyal D. A review on *Ficus palmata* (Wild Himalayan Fig). *J Phytopharmacol*. 2014;3(5):374-377.
6. Wadhi SR, Batra HN. Pests of tropical and subtropical fruit trees. In: Pant NC, editor. *Entomology in India*. New Delhi: The Entomological Society of India, 1964, 227-260.