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Cocoon Reconstruction Behavior in Spilosoma obliqua (Walker) Under Semi-Controlled Rural Conditions in Western Uttar Pradesh, India

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***Abstract*-- This study presents an observational case study of larval development, cocoon formation and pupation in Spilosoma obliqua under semi-controlled rural conditions in Western Uttar Pradesh, India. A single larva was collected from a berseem (Trifolium alexandrinum) agricultural field and maintained under ambient environmental conditions (28–37°C) and relative humidity ranging from 40–55%. The larva exhibited normal feeding behavior followed by a pre-pupal phase characterized by reduced activity and substrate-seeking behavior. During cocoon formation, an unintended physical disturbance resulted in displacement of the larva from its initial cocooning site. Following this event, the larva subsequently resumed cocoon construction using silk soil particles, tissue fibers, and plant fragments. Cocoon formation was completed within approximately 15–16 hours.**

Incomplete adult eclosion was observed during the late pupal stage with only partial emergence of anterior structures. The findings provide preliminary observational insight into developmental behavior and disturbance-associated cocoon reconstruction response under semi-natural conditions. However, interpretations remain limited due to the single-individual design and absence of replication.

***Keywords*-- behavioral observation, case study, cocoon reconstruction, larval development, pupation, Spilosoma obliqua**

I. Introduction

Spilosoma obliqua is a polyphagous lepidopteran pest widely distributed in agricultural ecosystems. The species undergoes complete metamorphosis involving larval, pupal, and adult stages. Previous studies have documented larval growth, feeding behavior, and developmental biology under controlled laboratory conditions. However, field-based observational records under semi-natural rural conditions remain limited.

Cocoon formation and pupation represent critical developmental stages in Lepidoptera and may be influenced by environmental disturbance. General metamorphic and developmental processes in insects have been described extensively by Chapman (2013) and Gullan & Cranston (2014).

Environmental stress and developmental disturbance have been reported to influence insect pupation and emergence success (Nation, 2015). However, behavioral responses to cocoon disturbance and reconstruction in S. obliqua remain limited. The present study reports an individual-based observational account of larval development, cocoon formation, and disturbance-associated cocoon reconstruction behavior under semi-controlled rural conditions in Western Uttar Pradesh, India.

II. Materials And Methods

A single larva of Spilosoma obliqua was collected on 2 April 2026 from a berseem (Trifolium alexandrinum) agricultural field in Western Uttar Pradesh, India. The specimen was maintained in a ventilated plastic container (~14 cm diameter) lined with soil and tissue substrate. A fine cotton mesh covering was used to permit ventilation while preventing escape. The larva was reared under natural day–night conditions without artificial environmental regulation. Ambient temperature ranged between 28–37°C and relative humidity ranged from approximately 40–55% under local rural environmental conditions.

Fresh Trifolium alexandrinum leaves were provided daily at approximately mid day and replaced once per day. Observations were recorded regularly throughout larval feeding, pre-pupal, pupal and cocooning stages. Body weight measurements were recorded periodically using a digital balance. Photographic documentation was performed at regular developmental intervals.

III. Observations

Developmental Timeline

- Collection: 2 April
- Cocoon initiation:12 April (~3 PM, disturbed)
- Cocoon reconstruction: same day (~5 PM)
- Cocoon completion: 13 April (~8:00-9:00 h)
- pupal stage observed: after 4days
- Cocoon formation duration: ~ 15-16 hours

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Fig.1 larval stage of Spilosoma obliqua

Fig.2 cocoon formation of Spilosoma obliqua

Quantitative Observations

Observation Day	Approximate Date	Weight (g)	Remarks
Day 1	2 April	1.1-1.2	Active feeding
Day 3	5 April	1.0	Normal feeding
Day 6	8 April	0.8-0.9	Reduced feeding
Day 9	11 April	1.1-1.3	Mature larva
Day 10	12 April	0.4-0.6	Pre-pupal stage
Day 14	16 April	0.45-0.5	Pupal stage

Cocoon Composition and Behavioral Features

S.No.	Observation Parameters	Description
1	Cocoon material	Silk, soil particles, tissue fibers, and leaf fragments
2	Cocoon type	Composite cocoon
3	Disturbance type	Accidental physical disturbance
4	Behavioral response	Relocation followed by cocoon reconstruction
5	Adult emergence	Incomplete eclosion observed

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IV. Behavioral Observation

During cocoon formation, an unintended physical disturbance occurred due to removal of surrounding tissue substrate during observation. Following this disturbance, the larva became displaced from the original cocooning site. The larva subsequently resumed cocoon construction within the same environment setup using silk material, tissue fibers, soil particles, and plant fragments. Partial emergence of adult structures, including forelegs and mouthparts was observed during the late pupal stage. However, complete adult emergence was not recorded.

V. Discussion

The present study documents the holometabolous development of Spilosoma obliqua under semi-controlled rural conditions. Observed developmental progression and behavioral transitions are generally consistent with known lepidopteran developmental patterns described by Chapman (2013) and Gullan& Cranston (2014). The present observation similarly recorded normal larval feeding followed by reduced activity during the pre-pupal stage. A notable observation in this study was the disturbance-associated cocoon reconstruction response. Following accidental disruption of the cocooning substrate, the larva resumed cocoon construction within the same environment. Such responses may suggest behavioral adaptability during pupation, although the interpretation remains preliminary due to the absence of replication.

Incomplete adult eclosion observed in the present study may therefore be associated with developmental stress; however, a causal relationship cannot be confirmed within the present observational design. The observations presented in this study are descriptive in nature and should not be interpreted as statistically representative biological behavior. As the study was based on a single specimen, the findings should be considered preliminary observational evidence rather than generalized biological conclusions.

VI. Conclusion

This case study documents larval development, cocoon formation, disturbance-associated cocoon reconstruction, and incomplete adult emergence in Spilosoma obliqua under semi-controlled rural conditions. This study provides preliminary observational insight into cocooning behavior and developmental responses following environmental disturbance. Due to the single-specimen observational design, the findings remain descriptive and exploratory. Further replicated investigations under controlled environmental conditions are necessary for broader biological validation.

REFERENCES

[1] Atwal, A. S., & Dhaliwal, G. S. (2007).Agricultural Pests of South Asia and Their Management. Kalyani Publishers, New Delhi, India.

[2] CABI.(2023). Spilosoma obliqua Datasheet.Invasive Species Compendium.CAB International, Wallingford.

[3] Chapman, R. F. (2013). The Insects: Structure and Function (5th ed.). Cambridge University Press, Cambridge, UK.

[4] Gullan, P. J., & Cranston, P. S. (2014). The Insects: An Outline of Entomology (5th ed.). Wiley-Blackwell, Oxford, UK.

[5] Nation, J. L. (2015). Insect Physiology and Biochemistry (3rd ed.). CRC Press, Boca Raton, Florida, USA.

[6] Triplehorn, C. A., & Johnson, N. F. (2005). Borror and De Long's Introduction to the Study of Insects (7th ed.). Thomson Brooks/Cole, Belmont, California, USA.

[7] Singh I, Singh G. Biology of Bihar hairy caterpillar, Spilosoma obliqua Walker on sunflower in Punjab. J Insect Sci. 1995;8(1):48-54.

[8] Bhadauria NK, Bhadauria NS, Jakhmola SS. Larval development and survival of Bihar hairy caterpillar, Spilosoma obliqua (Walk.) on different host plants. Indian J Entomol, 2001:63(4):475–477.

[9] Kennedy GG, Storer NP. Life systems of polyphagous arthropod pests in temporally unstable cropping systems. Annual review of entomology, 2000:45(1):467- 93.

[10] Pandit VR. Biology of Bihar hairy caterpillar, Spilarctia obliqua Walker (Erebidae: Lepidoptera) under laboratory condition on sunflower. J Farm Sci, 2020:33(2):284-287.

[11] Singh S, Seghal SS. Studies on growth and development of Spilosoma obliqua (Walker) on different food plants. Indian Journal of Entomology. 1992:54(4):471-482.

[12] Warad MA, Kalleshwaraswamy CM. Biology of Bihar hairy caterpillar, Spilarctia obliqua (Walker) (Erebidae: Lepidoptera) on field bean. Agric Update, 2017:12(5):1256-60.