

First record of *Diaphania pulverulentalis* (Hampson) (Lepidoptera: Pyralidae) on mulberry plants in Saharanpur Uttar Pradesh, India

Om Datta

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

*Corresponding author: Om Datta

Received 1 March 2026; Accepted 8 Apr 2026; Published 22 Apr 2026

DOI: <https://doi.org/10.64171/JAE.6.2.35-38>

Abstract

The mulberry leaf roller, *Diaphania pulverulentalis* (Hampson), is a significant defoliator of mulberry (*Morus* spp.) and a major pest in sericulture across India. Until now, its occurrence in Saharanpur district, Uttar Pradesh, had not been documented. This study reports the first confirmed presence of *D. pulverulentalis* in the mulberry-growing areas of Saharanpur, based on field surveys, morphological identification, and laboratory rearing conducted from July 2023 to February 2024. Larval infestation was observed on *Morus alba*, with typical leaf-rolling behaviour and feeding damage. The pest's life cycle, infestation pattern, are briefly discussed. The pest passed through five distinct larval stage with a total duration of 14.51 ± 3.33 days. The duration of pupal period, adult male and female was recorded of 8.31 ± 0.77 , 4.5 ± 0.52 , and 7.5 ± 0.52 days respectively. This record expands the known geographical range of *D. pulverulentalis* into the north western plains of India.

Keywords: *Diaphania pulverulentalis*, Mulberry leaf roller, *Morus* spp

Introduction

The mulberry leaf roller (*Diaphania pulverulentalis*) is the most serious pest of mulberry plants, which is reported from different parts of India including: Nagaland, Karnataka, Tamil Nadu, Andhra Pradesh, Punjab, Jammu, Kashmir, and Assam (Sharma and Tara, 1985; Dar, 1993; Gupta, 1994; Mavi *et al.*, 1996; Geetha Bai *et al.*, 1997; Illahi *et al.*, 2013; Borgohain *et al.*, 2015)^[4, 6, 3, 7, 2]. Being a devastating pest of mulberry plants, *D. pulverulentalis* is also a potential carrier of *Nosema bombycis*, which causes deadly pebrine disease to the silkworms, as the pebrine spores can enter rearing rooms through infected mulberry leaves (Ifat *et al.*, 2011)^[5]. The larvae of *D. pulverulentalis* cause severe damage to mulberry plants. Early instar larvae scrape the green tissues, while mature larvae skeletonize the leaves, causing significant damage to the apical shoots and overall leaf area (Ghatak *et al.*, 2009)^[8]. The mulberry is a perennial, hardwood, fast-growing plant that belongs to the genus *Morus* and family Moraceae (Pan and Lou, 2008; Yang, 2010)^[13]. The leaves of mulberry plants are extensively used for feeding and rearing the silkworm, *Bombyx mori*, for the production of silk. The silkworm converts the mulberry leaf protein to silk protein (fibroin and sericin). The mulberry has been used not only as silkworm feed but also as animal fodder and medicine in many countries for centuries. Currently, the mulberry is regarded as one of the sacred plants due to its distinctive pharmacological properties. The extract obtained from different parts of mulberry proved to be beneficial in protecting the liver, improving eyesight, facilitating discharge of urine, lowering blood pressure, and controlling anti-diabetic and anti-obesity

effects in humans as well as in animal models (Ghosh *et al.*, 2017)^[1]. Although, the mulberry leaf roller (*Diaphania pulverulentalis*) has been reported from various parts of India. However, no published entomological report has recorded this species from Saharanpur district, Uttar Pradesh, which lies in the Doab region of North-West India. A first record from Saharanpur would add significantly to its known distribution map.

Materials and Methods

Field surveys were conducted in mulberry plants in the Saharanpur district (29.964°N, 77.546°E) of Uttar Pradesh, covering roadside plants, farms and private holdings, and educational institutions. Saharanpur has a subtropical climate with hot summers and monsoon rains from June to September. Surveys were carried out monthly from June 2023 to February 2025. Random sampling of 10–15 mulberry plants per field was performed. Plants were inspected for signs of leaf rolling, larval presence, and feeding damage. During the survey, the mulberry plants were found to be infected with a leaf roller larva in the month of November at Government Degree College, Nanauta, Saharanpur.

The larvae and pupae were collected from this site and reared at room temperature (25–28°C, 70–80% RH). Adults were identified as *Diaphania pulverulentalis*. Biological parameters like egg period, pupal period, duration of larval instars, and longevity of adults were observed periodically. In order to record the seasonal incidence of *D. pulverulentalis* larvae, observations were made on the infested mulberry plants from June to February.

Results and Discussion

The results show that the female moth laid pale yellow eggs singly on the ventral surface of leaves along the leaf vein, which hatched in 3-4 (3.5 ± 0.52) days. However, Srinivasa Gowda (2000) [11] and Sharma *et al.* (2024) [15] reported egg periods of 4 and 2.11 to 4.01 (3.14 ± 0.96) days, respectively, which are more or less similar to our findings. Similarly, Geetha Bai *et al.* (1999) [9] observed the incubation period of *D. pulverulentalis* from 4 to 5 days on mulberry leaves, which indicates more or less similarity. The minor differences in the results may be due to geographical location and environmental factors. The larva passed through five distinct larval instars. The first larva was minute and fluorescent yellow in colour, whereas the second larva (Fig-1) was light yellowish orange in colour, having small sub-median black spots enclosed by white patches. The duration of the first and second instar larvae was recorded as 1.55 to 2.94 (2.24 ± 0.73) and 1.82 to 2.75 (2.28 ± 0.49) days. The third instar larva was deep orange in colour with visible dorsal and mid-dorsal lines and spots, while the fourth larval instar was dark greenish brown in colour. The duration of the third and fourth instar larvae was observed to be 1.96 to 2.98 (2.47 ± 0.53) and 2.5 to 4 (3.16 ± 0.079) days, respectively. The fifth larval (Fig-2) instar was dark pinkish brown in colour and pupated in dried leaves or soil. The duration of the fifth instar larva lasted for 3.52 to 5 (4.26 ± 0.78) days. Seelan (1999) recorded the duration of the first to fifth larval instar of *D. pulverulentalis* as 1.85, 2.84, 3.43, 3.64, and 3.92 days, respectively. Similarly, Srinivasa Gowda (2000) [11] reported that the duration of the five successive larval instars was 2.78 ± 0.03 days, 1.08 ± 0.01 days, 2.14 ± 0.01 days, 2.18 ± 0.02 days, and 2.11 ± 0.04 days, respectively. Sharma *et al.* (2024) [15] observed the duration of first instar larva from 1.54 to 3.47 (2.53 ± 0.97), second instar from 1.84 to 2.74 (1.51 ± 1.07), third instar from 1.94 to 3.51 (2.67 ± 0.79), fourth instar from 2.00 to 4.01 (3.19 ± 1.05), and fifth instar from 3.51 to 5.01 (4.35 ± 0.77) days, respectively. The total duration of the

larval period was recorded to be 11.35 to 17.67, with a mean duration of 14.51 ± 3.33 days, which is almost in accordance with the findings of Sengupta *et al.* (1990) [12], Anon. (1996a), Geetha Bai *et al.* (1999) [9], and Sharma *et al.* (2024) [15]. The duration of the pupa (Fig-3) ranged between 7 and 9, with an average of 8.31 ± 0.77 days. More or less similar pupal periods were observed by Geethabai *et al.* (1999) [9] and Rajadurai *et al.* (1999) [10]. However, Srinivasa Gowda (2000) [11] and Sharma *et al.* (2024) [15] reported the pupal period to be 7.18 to 11.06 (8.93 ± 1.97) days, respectively, which supports our results. The adult males and females were yellowish grey in colour and had lifespans of 4.5 ± 0.52 days and 7.5 ± 0.52 days, respectively. The longevity of these adults aligns closely with the findings of Sharma *et al.* (2024) [15], who reported lifespans of 4.00 ± 1.00 days for males and 7.52 ± 1.1 days for females. The longevity of females was observed to be longer than that of males.

Diaphania pulverulentalis was observed in Saharanpur after the onset of monsoon in the month of June. The pest remained active from June to February, with peak infestation from July to November. Kumar *et al.* (2022) also reported the incidence of *D. pulverulentalis* from June to February in Kerala. The immature larvae of *D. pulverulentalis* create a silken web among the apical tender leaves (Fig-4) and feed by scraping the tissue. As the larvae grow, they roll up the tender leaves and consume the entire leaf, leaving only the midrib and veins intact. *D. pulverulentalis* targets the apical region of the mulberry shoots. The larva hides itself inside the vulnerable sprout region of mulberry leaves bound by a silken thread before consuming the delicate green tissues on the leaf surface. The mature larvae feed voraciously, and the plant growth is hampered as the pest destroys the apical shoot, which impacts negatively on leaf production. Considerable infestation of *D. pulverulentalis* with significant damage was recorded on the mulberry plant (Fig-5, 6).

Table 1: Biological parameters of *Diaphania pulverulentalis*

Developmental Stages	Minimum (In days)	Maximum (In days)	Mean + S.D. (In days)
Egg period	3	4	3.5 ± 0.52
First instar larva	1.55	2.94	2.24 ± 0.73
Second instar larva	1.82	2.75	2.28 ± 0.49
Third instar larva	1.96	2.98	2.47 ± 0.53
Fourth instar larva	2.5	4	3.16 ± 0.079
Fifth instar larva	3.52	5	4.26 ± 0.78
Total larval period	11.35	17.67	14.51 ± 3.33
Pupal period	7	9	8.31 ± 0.77
Adult male	4	5	4.5 ± 0.52
Adult female	7	8	7.5 ± 0.52
Total life cycle of male	25.35	35.67	30.51 ± 5.43
Total life cycle of female	28.35	38.67	33.51 ± 5.41

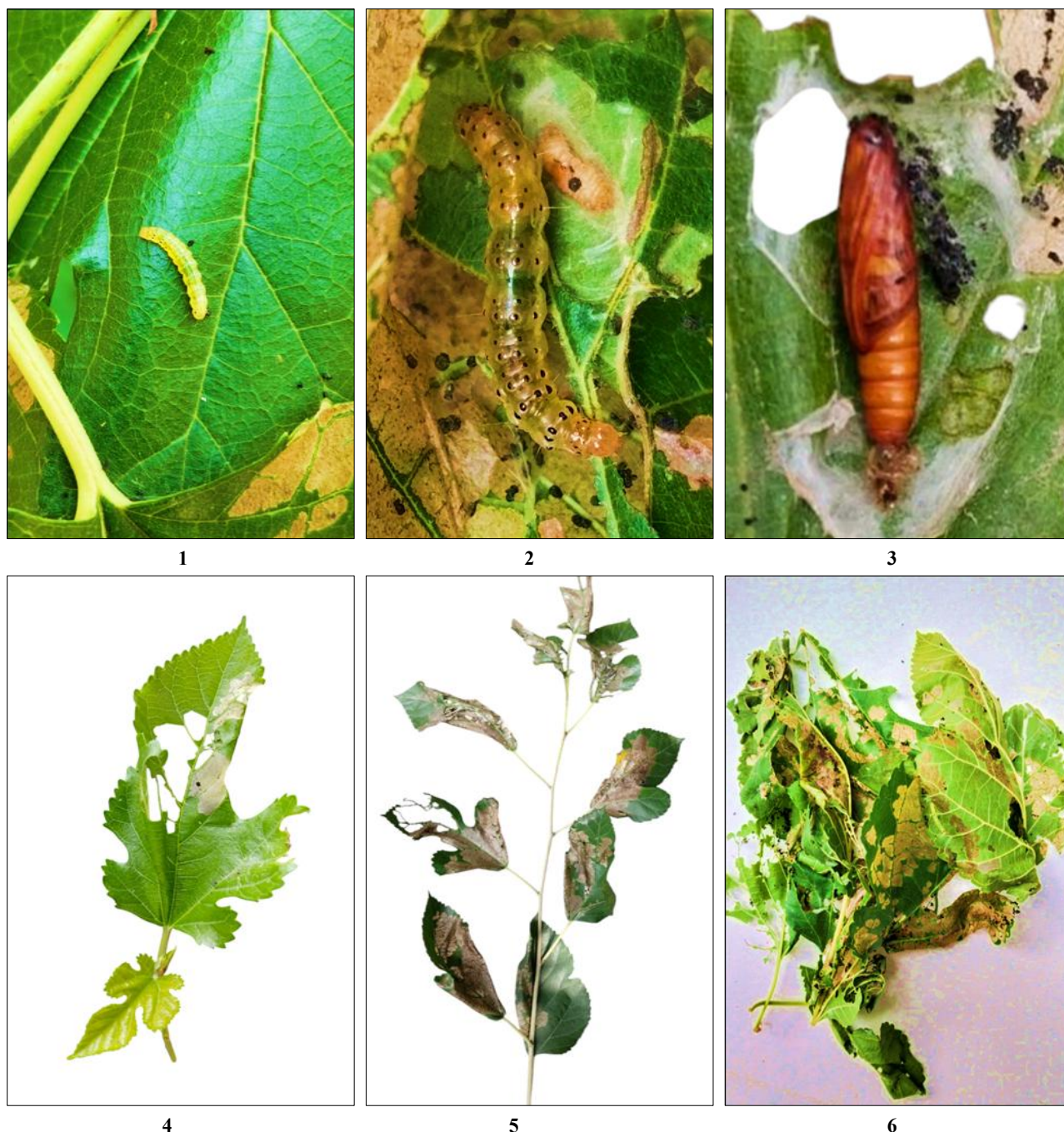


Fig 1: (1) Early instar larva (2) Final instar larva (3) Pupa (4) Rolled mulberry leaf (5) Infested and damaged twig of Mulberry plant (6) Damaged mulberry leaves

Conclusion

The mulberry leaf roller, *Diaphania pulverulentalis* is a serious pest of mulberry plants in silk-producing states like Nagaland, Karnataka, Tamil Nadu, Andhra Pradesh, Punjab, Jammu, Kashmir, and Assam of India where the mulberry plants are grown on large scale for rearing the *Bombyx mori*. In present study, *D. pulverulentalis* is first time recorded infesting mulberry plants in the Saharanpur district of Uttar Pradesh. The life cycle of the male and female leaf roller from egg till the survival of adults is completed in 30.51 ± 5.43 and 33.51 ± 5.41 days.

Acknowledgements

The author expresses gratitude to Dr. S.C. Dhiman, a retired professor from the Department of Zoology at Maharaj Singh College, for scientific discussions throughout the study.

References

1. Ghosh A, Gangopadhyay D, Chowdhury T. Economical and environmental importance of mulberry: A review. *Int J Plant Environ*. 2017;3(2):51–58.
2. Borgohain A, Bhattacharjee J, Dutta LC, Bhattacharya B, Singha TA. Mulberry leaf damage caused by leaf roller, *Glyphodes pyloalis* Walker. *J Exp Zool India*. 2015;18(1):313–314.
3. Gupta SL. Check list of Indian Pyraustinae (Lepidoptera: Pyralidae). *Mem Entomol Soc India*. 1994;14:1–87.
4. Sharma B, Tara JS. Insect pests of mulberry plants (*Morus* sp.) in Jammu region of Jammu and Kashmir State. *Indian J Seric*. 1985;24:7–11.
5. Ifat B, Sharma SD, Shabir AB. Screening of different insect pests of mulberry and other agricultural crops for

- microsporidian infection. *Int J Biotechnol Mol Biol Res.* 2011;2(8):138–142.
6. Dar MA. Observations on the biology of *Glyphodes pyloalis* Walker (Lepidoptera: Pyralidae), a serious pest of mulberry. In: *Proceedings of the II International Silk Conference*; 1993; China. p. 1–4.
 7. Mavi GS, Bhalla JS, Mann AS. *Glyphodes pyloalis* Walker (Lepidoptera: Pyralidae), pest of mulberry—a new record in Punjab. *J Seric.* 1996;4(1):28–29.
 8. Ghatak SS, Mondal S, Vishwakarma R. Biology of mulberry leaf roller *Glyphodes pyloalis* Walker (Lepidoptera: Pyralidae). Mohanpur (India): Department of Agricultural Entomology, Bidhan Chandra Krishi Viswavidyalaya; 2009.
 9. Geethabai M, Marimadaiah B, Narayanaswamy KC, Rajagopal D. An outbreak of leaf roller pest *Diaphania (Margaronia) pulverulentalis* (Hampson) on mulberry in Karnataka. *Geobios News Rep.* 1999;16(2):73–79.
 10. Rajadurai S, Manjunath D, Katiyar RL, Prasad KS, Sen AK, Shekar MA, *et al.* Leaf roller—a serious pest of mulberry. *Indian Silk.* 1999;37(12):9–12.
 11. Srinivasa Gowda R. Bioecology and management of mulberry leaf roller, *Diaphania pulverulentalis* (Hampson) (Lepidoptera: Pyralidae) [MSc thesis]. Bengaluru: University of Agricultural Sciences; 2000. p. 94.
 12. Sengupta K, Kumar P, Baig M, Govindaiah. *Handbook of Pests and Diseases Control of Mulberry and Silkworm.* Thailand: ESCAP; 1990. p. 88.
 13. Pan G, Lou CF. Isolation of an 1-aminocyclopropane-1-carboxylate oxidase gene from mulberry (*Morus alba* L.) and analysis of its function in plant development and stress response. *J Plant Physiol.* 2008;165:1204–1213.
 14. Yang X, Yang L, Zheng H. Hypolipidemic and antioxidant effects of mulberry (*Morus alba* L.) fruit in hyperlipidaemic rats. *Food Chem Toxicol.* 2010;48:2374–2379.
 15. Sharma RCM, Shyla PN, Lavanya V, Anil Kumar U. Biology of mulberry leaf roller, *Diaphania pulverulentalis* (Lepidoptera: Pyralidae), under laboratory conditions on mulberry. *Int J Appl Res.* 2024;10(2):126–129.