International Journal of Entomology Research
www.entomologyjournals.com
ISSN: 2455-4758
Received: 28-07-2026, Accepted: 27-08-2026, Published: 11-09-2026
Volume 11, Issue 3, 2026, Page No. 485-488

Occurrence of the black-headed caterpillar, *Opisina arenosella* Walker, on coconut in Satara District, Maharashtra, India

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Abstract
The black-headed caterpillar, *Opisina arenosella* Walker is an important defoliating pest of coconut, causing considerable damage to leaflets. The current investigation was commenced to document the occurrence of *O. arenosella* on coconut in Satara district of Maharashtra, India. During, 2025 field surveys were conducted in selected coconut-growing areas to assess the presence of the pest and its characteristic damage symptoms. Infested palms were identified based on the presence of larval feeding galleries, dried and discolored leaflets, and different developmental stages of the pest. The occurrence of *O. arenosella* in the surveyed areas indicates its establishment in the district and highlights the necessity of regular monitoring of coconut plantations. The findings emphasize the significance of early detection and implementation of practices under integrated pest management, particularly conservation and utilization of natural enemies, for sustainable suppression of this pest. The present study reveals practical evidence on the local occurrence of *O. arenosella* and can offer a baseline for further studies on its incidence, seasonal dynamics and management.

Keywords: *Opisina arenosella*, coconut, black-headed caterpillar

Introduction

Cocos nucifera L. is an economically important perennial crop cultivated extensively in tropical and subtropical regions. It contributes significantly to the agricultural economy by providing food, edible oil, fiber, tender coconut and several other products. The crop is cultivated under diverse agro-ecological conditions and it is an important source of income for small and marginal farmers. However, coconut yield is greatly affected by a complex of insect pests that attack different plant parts, majority on the leaves and spindle. Leaf damage by rhinoceros beetles ranged from 12.55 % to 35.5 % and spindle damage ranged from 33.3 percent to 45 per cent by Chalapathi *et al*., (2018) [3], while others attack the trunks (stems), Mathen (1962) reported that the red palm weevil, *Rhynchophorus ferrugineus* Oliv, is a severe pest attacking different species of palm trees (e.g. date palm, coconut palm, and royal palm).

Some are considered as major pests causes significant damage and yield loss, while some are less damaging. Most of the insects minor pests, either because the environmental conditions. The rhinoceros beetle, red palm weevil, black headed caterpillar and eriophyid mite were the major pests in Konkan region of Maharashtra. *Aceria guerreronis* is a serious pest in many coconut growing areas in India. This mite species was first described in 1965 from a specimen of Guerrero State, Mexico (Kurien *et al*., 1979) [8]. *Aleurodicus rugioperculatus* is an invasive pest consequences severe damage to coconut plant, having higher extent of infestation (70.2% to 165.4%). The nymph and adults feed on cell sap from the underside of the leaves and secret honeydew that develop sooty mold fungi and interfere the growth of the plants (Moon and Amin 2023) [11].

Among the foliage-feeding insect pests, the black-headed caterpillar, *O. arenosella* is the most important lepidopteran pest of coconut palm in India, Sri Lanka and Myanmar (Rao, 1924; Jayaratnam, 1941; Alam, 1962; CIE, 1966; Cock and Perera, 1987) [1, 5, 7, 14]. *O. arenosella* attacks coconut palms during its various growth phases from seedling stage to maturity. The incidence and severity of *O. arenosella* are not uniform throughout the year or across geographical locations. Environmental conditions, particularly temperature and moisture availability, can influence pest development and population build-up. The pest is particularly associated with coastal, backwater and humid environments, although outbreaks may also occur in inland areas, especially in the vicinity of water bodies (ICAR-NBAIR, 2026). Such ecological variability makes regular monitoring important for detecting early pest establishment and population increases.

In India, *O. arenosella* is distributed across several coconut-growing regions, including both coastal and interior areas of peninsular India. The occurrence of the pest in inland locations is particularly important from a surveillance perspective because favorable local conditions can facilitate population build-up and subsequent spread to neighboring coconut plantations. Therefore, documenting its distribution at the district and village level is useful for developing appropriate monitoring and management programmes (Lu *et al.*, 2023).

Maharashtra has considerable importance in coconut cultivation, particularly in the Konkan region, although coconut is also grown in inland districts. A recent survey conducted during 2023–24 across major coconut-growing districts of Maharashtra recorded the occurrence of the

black-headed caterpillar in Raigad, Kolhapur, Satara and Palghar. The infestation was reported as 2.0, 1.0, 0.80 and 0.36%, respectively, with an overall state incidence of 0.69% (Wankhede *et al.*, 2025) [15].

The documentation of *O. arenosella* in Satara is noteworthy because the district represents an inland agro-ecological region of Maharashtra. Although its presence has been recorded in the district, detailed information regarding its local distribution, field symptoms, infestation level and associated biological factors remains limited. Localized surveys are therefore necessary to generate baseline information and to determine whether the pest is occurring sporadically or becoming established in coconut-growing areas of the district.

Early detection and continuous monitoring are important components of black-headed caterpillar management. Field inspection of coconut fronds for characteristic galleries, dried patches, larval activity and natural-enemy occurrence can help identify pest inhabitants prior to approach damaging levels. Integrated approaches combining surveillance, cultural practices, removal of heavily infested material and conservation or augmentation of natural enemies are considered more sustainable than reliance on chemical control alone (Binoy *et al.*, 2024 [2]; ICAR-NBAIR, 2026).

Therefore, the current study was undertaken to document the occurrence of the black-headed caterpillar, *O. arenosella* Walker, on coconut in Satara district of Maharashtra, India**,** with emphasis on its field occurrence and characteristic damage symptoms. The study is expected to provide baseline information on the pest in the district and contribute to future investigations on its seasonal incidence, population dynamics, natural-enemy complex and integrated management.

Materials and Methods

During October 2025, the present investigation on the bionomics and damage triggered by the *O.arenosella* was conducted on coconut. Infested coconut leaflets showing characteristic silken galleries and feeding damage were collected periodically from naturally infested palms. Larvae and pupae present within the galleries were carefully isolated along with portions of the affected leaflets and transferred to labelled containers. The collected material was transported to the laboratory for further observation. Representative photographs of the egg, larva, pupa, adult taken with the help of DEC 2000 eyepiece camera capturing Image pro Ver. 6.0. Various life cycle stages of insect were photographed using stereo binocular microscope.

Results Discussion

Bionomics and morphometrics of *Opisina arenosella*:

Eggs: The eggs were oval and creamy white when freshly laid, gradually turning reddish before hatching. The eggs measured approximately 0.60–0.72 mm in length and 0.30–0.42 mm in width. The eggs observed in the present investigation were small, oval and pale in colour, with gradual color changes before hatching (**Fig 1**.b).The egg dimensions recorded were broadly comparable with those reported by Nguyen *et al.* (2025) [12], who documented eggs of approximately 0.72 mm in length and 0.42 mm in width. Minor differences in egg size may occur be cause of variation in rearing conditions and geographical origin of the population.

Larvae:

The larval body was initially pale with a distinct dark head and gradually became reddish-brown with longitudinal stripes (Fig.1.c). The larval size increased progressively with successive instars, ranging from approximately 1.35 mm in the first instar to 15.10 mm in the final instar. The larval period constituted the major portion of the immature development. Larvae showed progressive increases in body size during successive instars and retained the characteristic dark head capsule throughout development. The concealed feeding habit observed in the present investigation is an important biological feature because the larvae remain protected within galleries while feeding. Lu *et al.* (2023) also identified the larval stage as the principal damaging stage of the pest. The dimensions of the mature larvae found in the current study were within the range reported in earlier investigations. Nguyen *et al.* (2025) [12] recorded progressive increases in larval body length from approximately 1.35 mm in the first instar to about 15.10 mm in the final instar. The observed variation may be attributed to differences in host-plant quality, temperature, humidity and larval nutrition.

Pupa:

The pupae were initially greyish-white and subsequently became blackish-brown (Fig.1.d). Female pupae were comparatively larger than male pupae. Pupation occurred within the protective silken gallery on the coconut leaflet. The pupal stage was relatively short compared with the larval period. Female pupae were comparatively larger than male pupae, which agrees with the observations of Nguyen *et al.* (2025) [12]. Such sexual size differences may also contribute to differences in adult body size and reproductive capacity.

Adults:

The adults were small greyish moths, females usually larger than males. The adults were small, greyish moths, with females generally larger than males (Fig.1.e). The adult morphological characteristics observed during the study were rely with standard descriptions of *O. arenosella*. ICAR-CPCRI reports the adult as a small moth with a body length of approximately 10–15 mm and a wingspan of about 20–25 mm.

The larvae is the damaging stage of *O. arenosella*. The caterpillars weave silken webs reinforced with leaf bits and excreta on the lower surface of leaflets and devour the chlorophyll-containing abaxial leaf surface tissues, causing dryness of leaf (Fig.1 a).Severe damage results in drying of the outer and middle whorl of leaves, reduction in rate of production of flower spikes, increased premature nut fall and retarded growth (Lever, 1969). Damage to the leaves renders them unsuitable for thatching and for other purposes. The pest infests coconut palms throughout the year and the maximum pest population is observed in the field during summer. In severe outbreaks, all the fronds are affected and the plantation presents a burnt appearance.

Natural enemies has an important role in regulating populations of the black-headed caterpillar. Several parasitoids attack the larval and pupal stages of *O. arenosella*. A recent study from southern parts of India reported a diverse assemblage of chalcidid parasitoids associated with the pest and reported 11 chalcidid species from Karnataka, Kerala and Tamil Nadu (Binoy *et al.*,

2024) [2]. Another recent investigation from South India recorded six hymenopteran parasitoids associated with the larvae and pupae of *O. arenosella*, further demonstrating the importance of the parasitoid complex in natural pest regulation (Nivetha *et al.*, 2025) [13].

Overall, the bionomic observations obtained from Satara provide useful baseline information on the development and damage behavior of *O. arenosella* under local conditions. Since developmental rate can influence population build-up, further observations across different seasons would help establish the connection between temperature, pest development and field incidence. The information may also help for determining appropriate timing of monitoring and management interventions.

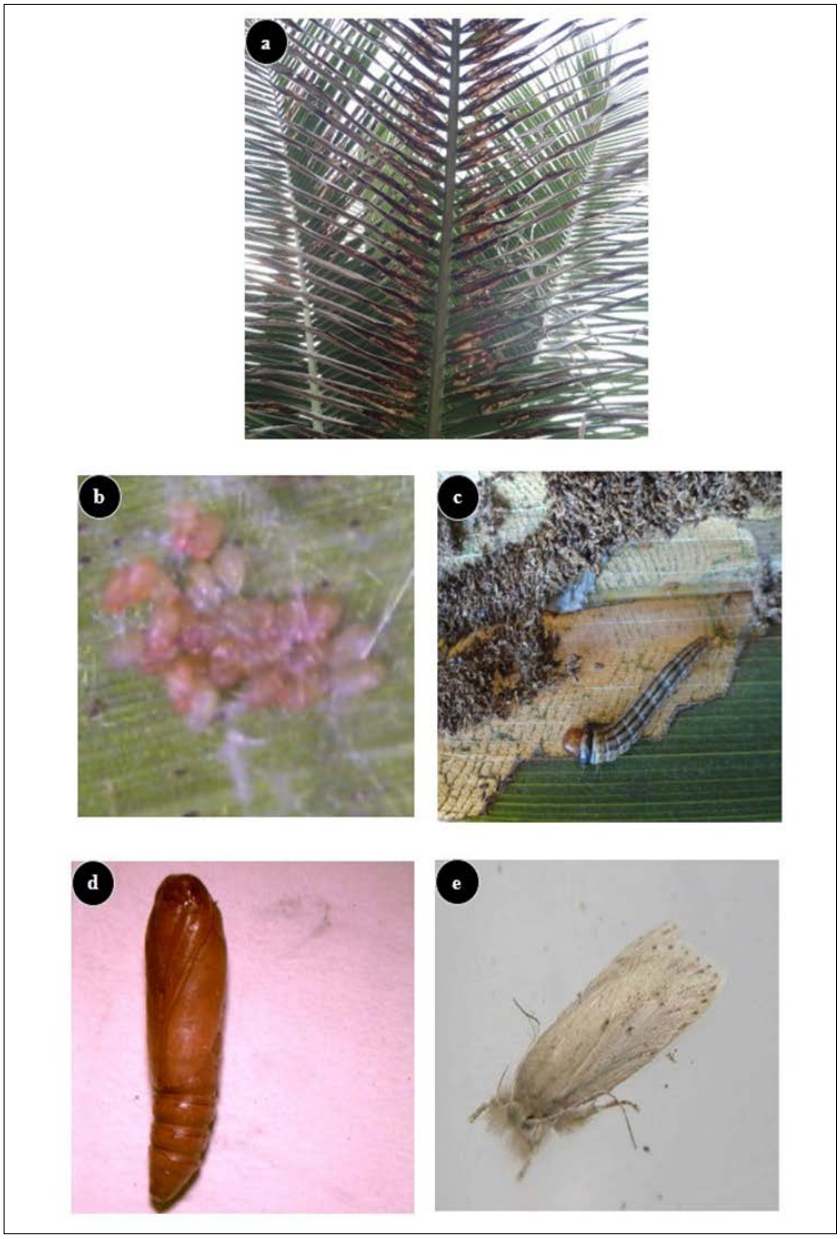

Fig 1: a- Galleries of silk and frass on underside of the leaves,
b- Eggs c- Larvae d- Pupa e- Adult

Acknowledgement

The authors sincerely acknowledge Dr. Rahul Khot, Deputy Director, Collections, Bombay Natural History Society (BNHS), Mumbai, for his valuable assistance in the confirming identity of the insect pest specimens and for his helpful guidance during the study.

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