



E-ISSN: 2320-7078

P-ISSN: 2349-6800

Impact Factor (RJIF): 5.83

www.entomoljournal.com

JEZS 2025; 13(6): 46-48

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Received: 25-08-2025

Accepted: 30-09-2025

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Nesting behaviour of potter wasp *Delta conoideum* (Gmelin, 1790) (Vespidae: Eumeninae) from Maharashtra

KM Sarkale and RP KavaneDOI: <https://www.doi.org/10.22271/j.ento.2025.v13.i6a.9628>**Abstract**

Solitary potter wasps live individual lives, and social wasps live in a colony. Nest is important for the protection of egg and their offspring. The nesting behaviour of delta conoideum was studied to study nest structure, construction behaviour, and provisioning of food from Sangli and Satara districts of Maharashtra. Nests of *D. conoideum* were found at many places in the study area. These nests are attached to the wall, the corners of the wall, and Stones. The female of *D. conoideum* constructs the nest with the help of mandibles and forelegs by using mud. The Structure of the nest of this species is pot-like. After the completion of nest construction, the wasp stores the lepidopteran larvae in this nest, and the opening of the nest is sealed with mud. *D. conoideum* wasps build several nests in the same site, and that nests are attached to each other.

Keywords: *Delta conoideum*, solitary wasps, nesting behaviour, eumeninae, Maharashtra**Introduction**

Family Vespidae consists of Vespinae, Polistinae, Stenogastrinae, and Eumeninae. This contains social and solitary wasps. Solitary wasps belong to the Subfamily Eumeninae. This subfamily contains the largest number of species within the family Vespidae, it contains 3794 species that belong to that subfamily (Pannure *et al.* 2016) [9]. It plays an important role in the agroecosystems that control many pests. Wasps belong to the Subfamily Eumeninae. These wasps are generally called potter wasps. These wasps build nests with the help of mud. Genus Delta belongs to the Subfamily Eumeninae. 7 species of the genus Delta were found in India. (Kumar *et al.* 2019) [6]. Nests are important for the complete life cycle of insects. The wasps life cycle, from egg to adult, is completed in its nest. The females of the solitary wasps construct their nest. Sites for nest construction vary from species to species. Solitary wasps construct their nests at different sites, like on the wall, the corner of the wall, in hollow pipes, behind the posters, cracks on the wall, on plants, in holes, in soil, and in leaves. These wasps prefer sites for the construction of nests in protective sites. These wasps have an important role in agricultural pest management due to their ability to prey on caterpillars of many agriculture pests. The main objective of this paper is to observe the nesting behaviour of *Delta conoideum*.

Materials and Methods

The present study was carried out in Satara and Sangli districts of Maharashtra. Observation was made during the period of December 2023 to November 2024. Observations of nesting behaviour were made. During this period, 21 nests were observed. Measurements of the nest were taken. Adult wasps were collected with the help of an insect collecting net. The collected wasps were killed by using ethyl acetate. It was pinned and dried for identification. Identification of the wasp was carried out with the help of the taxonomic key given by Kumar and Muzumdar (2015) [5]. Pictures were taken using a Sony camera.

Results and Discussion

A total of 21 nests of *Delta conoideum* were observed from different regions of the Sangli and Satara districts of Maharashtra. Nest construction was observed to begin in the morning hours. The species constructed pot-shaped nest using mud as the building material.

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Nests were generally attached to the corners of the cement walls. *D. conoideum* wasp selects a protective site for nest construction. These sites appeared to give protection from rain, environmental and human disturbance. The newly started nest construction site was attached to previously constructed nests.

Before the beginning of nest construction, the female wasp inspected the nest construction site (Fig. A). After the wasp starts nest construction (Fig. B). The females collected the mud using her strong mandibles and forelegs, forming a small mud ball. A wasp makes a small ball of mud and carried them in its mouth with the help of its mandibles towards the nest construction site. At the time of nest construction, wasps hold the mud ball by using their fore legs and that mud is spread on the nest construction site by their mandibles and forelegs. It gives proper pot shape to the nest by mandible and a pair of fore leg (Fig. C and D). Wasps applied the mud on nest construction site in 1 minute. After that, wasps went and come back after 3 minutes with another mud ball. Wasps take about 3 to 4 minutes to come and go to the nest construction site with a mud ball. Wasps take to the applied mud ball on the nest construction site within 1 to 1.5 minutes. Thus, the female made repeated trips between the mud source and the nest. The wasp completed nest construction within 3 hours. The completed nest measured 2.4 to 2.5 cm in length, 1.5 cm in height, and had a circular opening of about 1 cm in diameter.

Immediately after nest construction was completed, the female laid a single egg into the nest. During oviposition, she inserted her abdomen into the nest and stayed calm and did not move any part of her body. This freshly laid egg is attached to the roof of the nest (Fig. E and F). Egg-laying process completed in 4-5 minutes.

Following oviposition, the Female left the nest to search for prey, which serves as food for the developing larva. Wasps return to their nest with a caterpillar. The returning wasps fill this caterpillar into this nest at the time caterpillars head side was inserted first into the nest with the help of the mandible and a pair of forelegs and pushed into the nest (Fig. G). After insertion, of caterpillar wasps first enter firstly the antennae before the head into the nest. *D. conoideum* filled their nest with 4 lepidopteran caterpillars. After the filling of the caterpillar, the wasp closes the nest opening in two trips interval of 4 minutes. In the first trip wasp come with mud and closed the opening of the nest with help of mandible and pair of fore legs. In the second trip, wasp added another layer of mud to the closed mouth of the nest (Fig. H). After the completion of one nest construction instantly wasps start the next nest construction. The new nest is attached to the previously constructed nest.

The observations on nesting behaviour of *D. conoideum* shows close similarity to studies conducted on other eumeninae species. Udayakumar *et al.*, 2022 studied the nesting behaviour of the *Rhynchium brunneum brunneum* wasp which builds its nests in hollow cavities, and it provides lepidopteran larvae to its broods and its importance of biological pest control role in agriculture. Dang and Nguyen, 2019 detailed studied nesting biology and nesting behaviour of *Rhynchium brunneum brunneum*. Fateryga, 2013 described nest site, nest construction, structure of complete nest and nesting biology of *Odynerus albopictus calcaratus* and *Odynerus femoratus*. Matthews and Matthews 2009 studied that female of *Abispa ephippium* builds nest with mud and create funnel shaped entrance for nest. Buyanjargal and

Abasheev (2015) [1] conducted studies on trap nests of *Euodynerus dantici*, female wasp of *Euodynerus dantici* used mud as building material and build series on cells in trap nests and its show diversity in nest structure in same species. Deshmukh (2021) [3] studied the nesting behaviour of potter wasp *Delta pyriforme*. This wasp construct pot shaped nest and this nest is filled with caterpillar within day. Phong and Nguyen, 2024 recorded nesting behaviour of four species *Chalybion bengalense*, *Trypoxylon petiolatum*, *Delta esuriens*, and *Xenorhynchium nitidulum* that shows variation in nests structure, shapes, using different kinds of material, prey types and sites of nesting adapted to human structures. Mukundan *et al.* 2025 [8] studied that potter wasps thoughtfully select material that can be used in nest construction, the size of the soil particles, and wasps construct well shaped and sized nests for their young ones growth and survival.

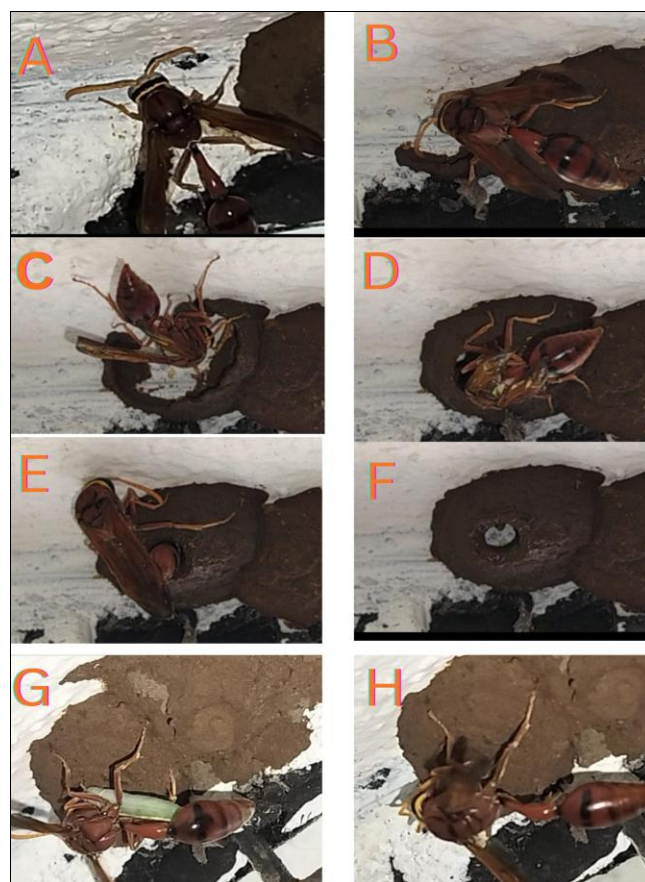


Fig 1: Images of nesting behaviour of *D. conoideum*. A- Nesting site, B- Nest construction start, C- Nest construction going on, D- Nest construction going on, E- Female laying egg, F- Nest contain egg, G- Caterpillar provision, H- Close the opening of the nest

Conclusion

A present study of the nesting behaviour of *D. conoideum* is observed and described. *D. conoideum* is a solitary potter wasp. The female constructs a pot-shaped nest by using the mandible and forelegs. She selects a protective site, builds the nest, lays the egg in the nest, fills the nest with caterpillars, before closes the nest. Total nest construction and filling of caterpillars into the nest is completed within a single day. It also plays an important role in the natural control of agricultural pests.

Acknowledgement

The authors express sincere gratitude to the Principal of

Yashwantrao Chavan Warana Mahavidyalaya, Warananagarto provide necessary facilities. The authors also thankful to Mahatma Jyotiba Phule Research and training Institute (MAHAJYOTI) financial assistance to carry out this research work.

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