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MATING AND HOST PARALYSING BEHAVIOURS OF *GONIOZUS* (=*PARASIEROLA*) *NFPHANTIDIS* (MUES.) (HYMENOPTERA: BETHYLIDAE) ON *OPISINA ARENOSELA* WLK. OF COCONUT

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Goniozus (=*Parasierola*) *nephantidis* (Muesebeck) (Hymenoptera: Bethylidae), the gregarious ectoparasitoid of the coconut leaf eating caterpillar, *Opsina arenosella* Wlk., is one of the widely used larval parasitoids for biological suppression of the pest in south India. Sequence of the courtship and mating behaviours of the parasitoid and its host paralysing behaviour are discussed. It was noticed that excessive mating and inbreeding had little adverse effect on the progeny of the parasitoid. Details such as time taken for subduing the host, location of stinging, its effect on the host and the time taken for oviposition on the paralysed host caterpillars of *O. arenosella* are also discussed. It was observed that the parasitoid attacked the host caterpillar 12 to 36 hours after the same was offered for parasitisation. Once the host caterpillar was stung between the head and thorax, paralysis of the same took place in three minutes and cessation of muscular movements in another 55 minutes. Normally, oviposition commenced 10 hours after the paralysis of the host caterpillar.

Key words: Goniozus nephantidis; mating and host paralysing behaviours; *Opisina arenosella*

Introducttan

Goniozus (=*Parasierola*) *nephantidis* (Muesebeck) (Hymenoptera: Bethylidae), the gregarious ectoparasitotd of the coconut leaf eating caterpillar, *Opisina arenosella* Wlk., is widely used in south India for biological suppression of the pest. Various aspects of this parasitoid have been studied by Rao and Cherian (1928), Antony and Kurian (1960) and Remadevi *et al.* (1978 and 1984). As detailed information on the mating and host paralysing behaviours of the parasitoid are lacking, these aspects were studied by us. The results obtained are presented in this paper.

Material and methods

G. nephantidis was reared in the laboratory in glass vials of size 7.5 x 2.5 cm, by releasing one mated female parasitoid and a healthy fully grown caterpillar of *O. arenosella* in each vial closed with cotton plug. Such vials were kept under continuous observation for studying the host paralysing behaviour of the parasitoid.

The mating behaviour of *G. nephantidis* was studied under Nikon binocular stereomicroscope immediataly after the emergence of the adult parasitoids from the cocoons.

Results

Mating behaviour

Unlike other species of parasitoids, the males of *G. nephantidis* do not become excited in the presence of virgin females and mount hurriedly for mating. This is probably

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because the number of males developed in a brood is always small and that the females are highly polyandrous, which allow the males to mate many times without any resistance. During mating, wing fanning is present, though not always, and the attennae, mouth parts and a pair of legs are also used. The following events are observed in the course of mating:

1. The male mounts without excitement.
2. Without courtship, it assumes the copulation position.
3. The bases of the wings are held by the prothoracic legs.
4. With the meso and metathoracic legs the male holds the abdomen of the female. Tibia and tarsus of both the legs are held close to one another and placed venrally on either side of the genital pore in a characteristic slanting position, like the apex of a triangle, but without touching. The mouth is pressed against the wings of the female.
5. The male loops the abdomen and places the tip over the genital pore.
6. If the genital pore is not opened immediately, the male gently taps the female with his antennae and rubs one of her legs with his.
7. The female raises her abdomen and opens the genital pore. Male mates with the characteristic fanning of wings, which lasts for 6 seconds to 2.5 minutes.
8. Male terminates mating and without dismounting he may mate upto four times at a strectch. One female parasitoid mated 17 times with different males in 45 minutes.

It was observed that excessive mating and inbreeding had no adverse effect on the progeny of *G. nephantidis*.

Paralysing the host

Normally, this parasitoid is reared in the laboratory in glass vials (7.5 x 2.5 cm) using one female parasitoid and a fully grown *O. arenosella* or *Corcyra cephalonica* caterpillar. The parasitoid will not attack the host caterpillar for about 12 to 36 hours. By this time the caterpillar may start spinning cocoon for pupation. Before completion of the cocoon the parasitoid enters the same and waits there without giving an impression to the host larva that it is an enemy. It attacks all of a sudden, mounting on the anterior end of the host larva and inserting the ovipositor on the ventral side, between the head and thorax. The host larva will violently react and frantically try to dislodge the parasitoid without success. Sometimes it may come out of the cocoon. If the parasitoid stings between the head and thorax, the host larva is paralysed in about three minutes and the normal muscular movements of the caterpillar get ceased in another 55 minutes. However, if the sting is received a little away from the head, it may take about 6-8 minutes for paralysis. Once the host larva loses its ability to move, the parasitoid removes the ovipositor and dismounts.

The parasitoid tries to drag in and put inside the cocoon those caterpillars which lie paralysed outside, before oviposition. Normally, oviposition commenced 10 hours after paralysis of the host caterpillar.

Discussion

It is interesting to note that *G. nephantidis* is highly polyandrous and still it produces progeny which is always female-biased. In a brood of 19 to 22 parasitoids only one or two will be males and the remaining females. Unlike the males of many other parasitoids of *O. arenosella* such as *Brachymeria* spp. and *Xanthopimpla* spp. the male of this parasitoid does not show any excitement in the presence of the virgin females, but assumes copulation position without any specific courtship behaviour. Another interesting feature with *G. nephantidis* is that it does not attack the host for several hours after coming in contact with the same. The parasitoid moves nearer to the host many times, but attacks the host all of a sudden and leaves it only when it is paralysed. Oviposition also does not commence immediately after paralysis of the host. *G. nephantidis* requires two to three days for paralysing a host and oviposition on it. These factors are significant in the programme of mass multiplication of the parasitoid for biological suppression of the coconut caterpillar.

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