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OBSERVATIONS ON *EURYTOMA ALBOTIBIALIS* ASHMEAD (HYMENOPTERA: EURYTOMIDAE), A HYPERPARASITOID OF THE COCONUT LEAF EATING CATERPILLAR, *OPISINA ARENOSELLA* WLK.

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Eurytoma albotibialis Ashmead, recorded as a hyperparasitoid as well as a primary parasitiod of the coconut leaf eating caterpillar, *Opisina arenosella* Wlk., is predominantly a hyperparasitoid parasitising the larval/pupal stages of several species of primary parasitoids of the pest. Its importance as a secondary parasitoid in minimising the role of *Brachymeria* spp. has been overlooked so far. The peak activity of *E. albotibialis* synchronised with that of *Brachymeria* spp. and *O. arenosella* during April and May. Consequently, the build up of population of *Brachymeria* spp. was checked considerably at a time when the pest was likely to multiply rapidly taking advantage of the high temperatures of the summer season and the low levels of population or total absence of certain other species of parasitoids It was observed that during April and May, *E. albotibialis* suppressed 13.11% and 43.48%, respectively, of *Brchymeria* spp. populations in the field. Mating behaviour, oviposition and development of the hyperparasitod and its population abundance in the field are also discussed. Egg to adult stages of the hyperparasitoid were completed in 13-19 days(egg period 24-28 hours, larval 6-9 days and pupal period 6-9 days). Longevity of adults ranged from 30-105 days and the sex ratio was always female-biased (male : female ratio :16). The life cycle of the secondary parasitoid was almost comparable to that of *Brachymeria* spp., which constitute the dominant species of pupal parasitoids of the pest.

Key. words. Eurytoma albotibialis; primary and secondary parasitoid; *Opisina arenosella.*

Introduction

Eurytoma albotialis Ashmead (Hymenoptera : Eurytomidae) is reported as a primary pupal parasitoid of *Opisina arenosella* Wlk., the leaf eating caterpillar pest of coconut, and also as a secondary parasitoid of the pest. Dharmaraju (1962) in Sri Lanka, Rao and Dharmaraju (1967) in Andhra Pradesh and Joy and Joseph (1977 and 1978 and Mohamed *et al.* (1982) in Kerala observed it as a primary parasitoid. However it was recorded to parasitise the primary parasitoids of the pest such as *Apanteles taragamae* Wilkinson (Hymenoptera : Bracondiae) and *Goniozus*(=*Parasierola nephantidis* (Mues) (Hymenoptera ; Bethylidae) in south India (Rao *et al.* 1948) and *A. taragamae, G. nephantidis, Eriborus trochanteratus* (Morley) (=*Dioctes* sp.) (Hymenoptera : Ichneumonidae) and *Spoggosia* (=*Stomatomyla*) *bezzaina* (Baranoff) (Diptera: Tachinidae) in Sri Lanka (Dharmaraju, 1962).

Recent observations made by us clearly reveal that *E. albotibialis* is an important hyperparasitoid of *O. arenosella* parasitising especially the primary parasitoids, *Brachymeria* spp., in Kerala and that it develops on *O. arenosella* as a primary parasitoid only very rarely. As such, it is more appropriate to treat *E. albotibialis* as a

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secondary parasitoid. The hosts such as *A. taragame*, *Bracon hebetor* Say, *G.nephantidis* etc. supply only inadequate nutrition and consequently the progeny emerging from these hosts would mostly be males.

Very little information is available on the biology of this secondary parasitoid and its critical role in reducing the impact of *Brachymeria* spp. in the natural suppression of the pest was overlooked so far. In this paper we furnish a rearing method and the mating behaviour and seasonal abundance of this hyperparasitoid.

Materials and Methods

Rearing: The technique developed by Pillai and Nair (1982) for rearing *Brachymeria nosatoi* Habu and other species of chalcidid parasitoids was adopted for the laboratory culturing of the hyperparasitoid. Several adults of *E.albotibialis* emerged in the laboratory along with *Brachymeria* spp. from the field-collected *O. arenosella* pupae were released in glass bottles, 17.5 cm long and 6.75 cm wide, containing honey provided as food as minute droplets on wax-coated paper. The mouth of the bottle was covered with muslin cloth and held tight with rubber bands, The pupae of *O. arenosella* parasitised by *Brachymeria* spp., after 7-9 days were exposed to adult parasitoids by spreading them on a strip of card board. The bottle containing the hyperparasitoid and the host pupae was kept horizontally for oviposition for two days, after which the parasitised pupae were removed and stored in another glass bottle for emergence of the progeny of the hyperparasitoid.

For the purpose of biological observations a few females of *E. albotibialis* were released into glass vials containing cocoons of *B. hebetor*, so that the oviposition and further development of the hyperparasitoid could clearly be observed without disturbing the host or the parasitoid.

Two hundred and thirty laboratory-reared pupae of *O. arenosella* were exposed to the females of *E. albotibialis* in five replications. The pupae remaining within the cocoons in silken galleries and those removed from the cocoons were spread on a card board piece and inserted into the horizontally placed glass bottle containing the adults of *E. albotibialis* for oviposition,

The population abundance of *E. albotibialis* was studied by rearing the pupae of *O. arenosella* collected from coconut gardens around Kayangulam.

Results

Courtship and mating: Females mate soon after emergenee with the earlier emerged males. Sexually excited male sways the front part of his body and vibrates the wings. On mounting, it proceeds towards the head of the female. She is held on the head with the forelegs and the thorax with the middle and hind legs and tries to elevate the antennae of the female. The female may hold her antennae horizontally or vertically. The male places his antennae between the antennae of the female and antennate, if she holds them horizontally. In vertical position, the male may tap the tip of the closely held antennae of the female with the mouth parts. He may also strike the tip of the female's antennae with his. The courtship is brief. The female raises her abdomen and exposes the genital pocket. The male backs up to mate for five seconds and terminates mating. He may remount after a while, repeats courtship and mates again and again.

Oviposition: In *O. arenosella* pupae parasitised by *Brchymeria* spp. the female *E. albotibialis* inserts her ovipositor in the anterior end. The inner side of the pupal case is closely probed with the ovipositor. The developing parasitoid was then pierced and two to three eggs laid.

Egg laying was clearly visible in glass vials containing the cocoons of *B. hebetor*. Larvae and pupae were acceptable for oviposition. The host was pierced several times with the ovipositor, the inner side of the cocoon was thoroughly probed and then the egg laid. It took nearly 20 seconds for laying an egg and the next egg was laid in another five minutes. The egg of *E. albotibialis* is nearly elliptical with a leathery, white chorion beset with short, stout, white, shoe-nail like processes, which turn to light green in 30-60 minutes and then to snuff colour. The narrow end of the egg possesses a short collapsible tube. The young larvae are cannibalistic and only one completes the life cycle.

Out of a total of 230 laboratory-reared fresh pupae of *O. arenasella* exposed for parasitisation by *E. albotibialis* only four adult parasitoids could be obtained.

Population abundance in the field: Adults of *E. albotibialis* emerged in the laboratory from the parasitised pupae of *O. arenosella* collected from the field, almost throughout the year. However, its peak period of activity was during April-May. Pillai and Nair (1981) had recorded an overall parasitism of 1.54% by it, wherein they had mentioned it as a hyperparasite. Among the *Brachymeria*-parasitised pupae of *O. arenosella* collected from infested coconut gardens around Kayangulam, parasitism by it in April-May, 1985 was 13.11% (6/61) and 43.48% (20/46), respectively. The peak period of activity of *E. albotibialis* incidentally coincided with the peak period of population abundance of *Brachymeria* spp. in the field. During this period profuse breeding of the pest, *O. arenosella*, also takes place. The high temperatures of the summer months adversely affect the other species of parasitoids, particularly the pupal parasitoid *Trichospilus pupivora* Ferr. By arresting the multiplication of *Brachymeria* spp. during April-May *E. albotibialis* provides congenial conditions for the rapid build up of *O. arenosella*.

These data clearly indicate that *E. albotibialis* plays a very significant role in suppressing the population of the primary parasitoids of *O. arenosella*. We have also reared *E. albatibialis* from the field collected cocoons of *B. hebetor*, *Brachycoryphus* (=*Goryphus*) *nursei* (Cam.), and *G. nephanitais*. The hosts such as *B. hebetor*, *G. nephantidis* and *A. taragamae* are quite unsuitable for the multiplication of *E. albotibialis*. Still the hyperparasitoid attacks them and produces puny males, presumably due to inadequate nutrition.

Life cycle

Pre-oviposition period	:	2-3 days
Egg period	:	24-28 hours
Larval period	:	6-9 days
Pupal period	:	6-9 idays
Egg to adult stages	:	13-19 days
Longevity of adults	:	30-105 days
Sex ratio of adults (male : female)	:	1:6

Disussion

E. albotibialis reported as a hyperparasitoid as well as a primary parasitoid of the coconut leaf eating caterpillar, *O. arenosella* is predominantly a hyperparasitoid on

the larval/ pupal stages of many species of primary parasitoids of the pest. Our observations clearly revealed that this species develops in *O. arenosella* pupae as a primary parasitoid only very rarely. As such, it is more appropriate to treat this species as a hyperparasitoid of *O. arenosella.* Its importance as a secondary parasitoid in minimising the impact of *Brachymeria* spp. in the natural suppression of the pest was overlooked so far. Its peak period of activity synchronises with that of *Brachymeria* spp. and *O. arenosella* during April-May. Consequently, the build up of the population of *Brachymeria* spp. is checked considerably at a time when the pest is likely to multiply rapidly taking advantage of the prevailing high temperatures of the summer months and the low levels of population or the total absence of certain species of primary parasitoids of the pest. Besides *Brachymria* spp. no other primary pupal parasitoid emerged from *O. arenosella* pupae collected from the field during summer months. The life cycle and longevity of this secondary parastoid are almost comparable to those of *Brachymeria* spp. Its sex ratio is highly emale-biased (1:6). The female *E. albotibialis* is polyandrous

Regular monitoring of the field population of *E. albotibialis* is quite essential in view of the fact that it suppresses the populations of *Brachymerta* spp. which are the dominant species of pupal parasitoids exerting a considerable degree of pest suppression, particularly during the summer season, the peak period of pest abundance.

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