Reproductive Biology of *Eretmocerus warrae* Naumann and Schmidt (Hymenoptera: Aphelinidae)

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Abstract

Eretmocerus warrae Naumann and Schmidt is a thelytokous and specialist parasitoid of the Greenhouse whitefly, *Trialeurodes vaporariorum* (Westwood). Prior to this research, little information was available on its reproductive biology. Emergence of *E. warrae* occurs exclusively during the photophase and peaks during the first few hours of the photophase and then decreases rapidly afterwards. However, *E. warrae* adults remain active throughout 24 hours with host feeding peaking between 4 and 6 h and oviposition peaking between 10 and 14 h after lights on. With the increase of temperature from 15 to 30°C the average daily host feeding rates increase while the pre-oviposition period, longevity of adults and developmental period of immatures decrease. The maximum fecundity and host feeding of adults, and survival and emergence of offspring occur at 20 and 25°C. *E. warrae* successfully parasitises and feeds on all four nymphal instars of the greenhouse whitefly but eggs laid under the third to fifth stages of the fourth instar nymphs fail to complete development. *E. warrae* prefers the second and third instar nymphs for feeding and oviposition with higher survival rate of offspring. However, with the increase in host stage the parasitoid offspring gain more fitness with larger body size, higher egg load and longer longevity. Experienced females can discriminate between the parasitised and unparasitised hosts and avoid to superparasitise them when host density is high. However, the naïve females frequently lay eggs under the parasitised hosts. When initially deprived of food and hosts for 5 hours, *E. warrae* increases host feeding, fecundity and longevity. Females carry some mature eggs in their ovaries at emergence, and hence this is a pro-synovigenic species. Food and host deprived females can maintain eggs for up to two days while honey-fed females can keep eggs for up to 5-7 days. With the increase of host density the fecundity, parasitism, host feeding and longevity in *E. warrae* increase while the proportion of hosts fed on, parasitised and superparasitised decreases. Superparasitism increases with the increase in parasitoid density. Parasitoids emerging from singly parasitised hosts are larger, carry higher egg load and live longer than those from superparasitised hosts. Honey-fed parasitoids live 4-5 folds longer than those not provided with food or hosts after emergence. Honey-and host-fed parasitoids also live longer than those provided with hosts only. The findings from this study in relation to biological control of *T. vaporariorum* using *E. warrae*, e.g., mass-rearing or field release, are discussed.

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