Behavioural response in an asilid fly: Influence of ecological and environmental factors on spatial density dependence

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Abstract

Behavioural response of a parasitoid shows the effect on host parasitism patterns at a given host distribution resulting in an increase or decrease of parasitism intensity according to local host densities. This relationship could be proportional, positive, or negative, as a consequence of foraging of parasitoids searching for hosts. Mallophora ruficauda is a fly parasitoid of Cyclocephala signaticollis scarab beetle larvae and a predator of honeybees. Females search and place egg-clusters overground in open grasslands near beehives. Larvae actively searching for host underground following chemical cues arising from the host itself. The parasitism pattern is a result of this complex host-searching strategy which is shared between both stages of the fly. In this work we carried out a study at four spatial scales in apiaries located in the Pampas region of Argentina. We found that parasitism is inverse density-dependent at high female activity and direct density-dependent at low female activity at the larger spatial scale. We found a direct density dependent pattern associated to substrate height at intermediate spatial scale that is lost when the habitat has abundant oviposition substrates. Conversely, parasitism is inversely density-dependent at both smaller spatial scales, associated to oviposition substrate distance and saturation of healthy host by larvae attacking. We also found that M. ruficauda do not selects the oviposition substrates according to the abundance of Cyclocephala signaticollis inhabiting underground. We discuss the implications of host searching behaviour on the observed parasitism patterns.

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