BENEFICIAL ARTHROPOD BEHAVIOR MEDIATED BY AIRBORNE SEMIOCHEMICALS

V. Influence of Rearing Method, Host Plant, and Adult Experience on Host-Searching Behavior of *Microplitis croceipes* (Cresson), a Larval Parasitoid of *Heliothis*

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Abstract—Rearing the parasitoid *M. croceipes* on hosts fed cowpea-seedling leaves instead of artificial diet increased the percentage of oriented flights to odors of a cowpea seedling-*H. zea* complex in a flight tunnel. However, the increase in response was much stronger after adult females had searched a fresh plant-host complex just prior to a test. The host plant appears to be of major importance in the parasitoid-host relationship: host-plant species, growth phase, and part of the host plant influence the parasitoid's response in the flight tunnel. The percentage of inexperienced females responding to infested leaves was higher for 4- to 5-day-old females than for 0- to 1-day-old females, while the response to uninfested flowers was equally high for both age groups. Olfactory experience with odors of an attractive plant-host complex increased the response to an unattractive plant-host complex. Possible implications of the results are discussed.

Key Words—*Microplitis croceipes*, Braconidae, Hymenoptera, *Heliothis zea*, Lepidoptera, Noctuidae, olfaction, flight, olfactory experience, rearing.

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INTRODUCTION

Host specialists may be more likely to have an innate response to stimuli that are directly related to the host or to the host habitat than are host generalists (Vet, 1983; Waage, 1979). Females of the host specialist *Microplitis croceipes* (Cresson), an important larval endoparasitoid of *Heliothis zea*, show an innate host-searching response when they make contact with feces of the host. They restrict the host-searching area by drumming the surrounding substratum with their antennae (Lewis and Jones, 1971). Yet, in a flight tunnel the females do not fly upwind to *H. zea* feeding on cowpea-seedling leaves unless they had previously contacted feces (Drost et al., 1986). Contact with feces may often be followed by oviposition once the host is found; however, oviposition was not required for obtaining increased flight responses. Thus, contact with feces induces a change in the behavior of the parasitoid. We will use the term "experienced" for adult females that had searched a plant–host complex and oviposited once and "inexperienced" for females that had no oviposition experience and no contact with host- or host-plant related cues since emergence.

Parasitoids used by Drost et al. (1986) were reared on *H. zea* larvae feeding on an artificial pinto-bean diet (Burton, 1969). Perhaps this rearing method has influenced the responsiveness of the adult females. Sauls et al. (1979) reported that feces from hosts fed artificial diet elicit less antennation in adult female *M. croceipes* than do feces from hosts fed cowpea-seedling leaves. During the development of the parasitoid in the host larvae, the parasitoid perhaps perceives chemical cues derived from the host’s diet that are required as a later reference in the host-finding process.

Another factor that may cause low responsiveness of the parasitoids may relate to the quality of the source emitting the odors in the flight tunnel, which is determined by the host and the host plant. The host-plant species of *H. zea* influences the parasitization rates by *M. croceipes* in the field, as was reported by Danks et al. (1979). The likelihood of attack and the probability of successful parasitism is correlated with the host-plant species (Mueller, 1983). The influence of the host-plant species on host-searching behavior by inexperienced *M. croceipes* has not been determined previously. In addition to host-plant species, the growth phase and part of the plant might influence the response by *M. croceipes*. One might expect the parasitoid to fly more frequently to plant species, plant growth phases, and plant parts on which hosts are most likely to occur, such as fruits and young leaves on which third-instar *H. zea* larvae prefer to feed (Schmidt, 1985). For example, Elzen et al. (1987) found *M. croceipes* females responding to odors of uninfested cotton.

The age of the adult parasitoid may influence its response to host-related odors. Although Drost et al. (1986) found that the age of the adult female does not influence the flight response of experienced females, this might not be true