Abstract—Diaeretiella rapae (M'Intosh) (Hymenoptera: Aphidiidae) is a parasitoid of several aphid species, including the Russian wheat aphid (RWA), Diuraphis noxia (Mordvilko), and the cabbage aphid (CA). Brevicoryne brassicae (L.). The response of mated D. rapae females to odors from wheat, cabbage, and plant-host complexes was investigated using a four-choice olfactometer. Experienced parasitoids, but not inexperienced females, responded positively to odors of the wheat-RWA complex in a no-choice test. In choice tests, experienced parasitoids did not respond to odors of uninfested cabbage and wheat leaves, but did respond positively to aphid-infested plants and to aphids alone. The response of D. rapae to the cabbage-CA complex and to CA alone was significantly greater than to the wheat-RWA complex and RWA alone, suggesting an innate odor preference for crucifer-feeding aphids.

Key Words—Kairomone, biological control, cabbage, wheat, Diuraphis noxia, Brevicoryne brassicae, olfactometer, infochemical, preference, host plants.

INTRODUCTION

Chemical orientation plays an important role in host-habitat location and host location by insect parasitoids (Vinson, 1981; Weseloh, 1981). The olfactory
cues eliciting the searching process may originate from the host plant, the host, or a combination of plant and host factors (Vet and Dicke, 1992). The utility of olfactory cues depends on their reliability in indicating herbivore presence, identity, accessibility, suitability, and detectability (Steinberg et al., 1993; Vet and Dicke, 1992). Therefore, the information value of odor stimuli from the host and host plant is important to aid the parasitoid in selecting a suitable host.

Olfactometry has been widely used to demonstrate responses of aphid parasitoids to host food plant odors and their aphid hosts (Bouchard and Cloutier, 1985; Powell and Zhang, 1983; Read et al., 1970; Wickremasinghe and van Emden, 1992). In a few studies, flight responses of aphidiids to host plants and hosts have been investigated in wind tunnels (Grasswitz and Paine, 1993; Guerrieri et al., 1993; Sheehan and Shelton, 1989a) or in the field (Sheehan and Shelton, 1989b; Titayavan and Altieri, 1990). Some of these studies have addressed the relative value of volatile infochemicals from the aphid host plant, the aphid host, and the plant–aphid complex (Grasswitz and Paine, 1993; Guerrieri et al., 1993; Wickremasinghe and van Emden, 1992).

*Diaeretiella rapae* (M’Intosh) (Hymenoptera: Aphidiidae) parasitizes over 30 aphid species on a variety of plants (Mackauer and Stary, 1967), including the cabbage aphid, *Brevicoryne brassicae* (L.), a worldwide pest of cruciferous crops, and cereal aphids such as the Russian wheat aphid (RWA), *Diuraphis noxia* Mordvilko. Various strains of exotic *D. rapae* have been released in the United States for establishment as a natural enemy of the RWA (McKinnon et al., 1992). Some researchers (e.g., Sheehan and Shelton, 1989a) indicate that the cabbage aphid (CA) is the preferred host of this parasitoid, but olfactory or ovipositional preference of this generalist aphid parasitoid has not been directly tested. This study examines the role of experience and odor preferences of mated *D. rapae* females in choice tests to odors from cabbage and wheat, the respective plant–aphid complexes, and the two aphid species alone. An understanding of the olfactory preference of *D. rapae* between the cabbage and wheat systems will aid in our understanding of host-finding behavior, which in turn will be important in the design of programs to manage, manipulate, or select potential parasitoids in biological control.

**MATERIALS AND METHODS**

The *D. rapae* females used in all tests were a strain (T92008) obtained from China supplied by the USDA/ARS Plant Science Research Laboratory. All parasitoids were reared continuously on the RWA and the TAM-101 or Mit cultivars of winter wheat (*Triticum aestivum* L.). The colony was maintained in a controlled environment chamber at 25°C under a 16L:8D photoperiod. Both the winter wheat and cabbage, *Brassica oleracea* L., were reared in a