IOBC Working Group Meetting on "Pheromone and Other Semiochemicals in Integrated Production"
Erice, September 2002

The role of the *Matsucoccus josephi* sex pheromone in the reproductive biology of its predator *Elatophilus hebraicus*

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ABSTRACT

Predatory bugs of the genus *Elatophilus* spp. (Heteroptera: Anthocoridae) use the sex pheromone of their prey, pine bast scales *Matsucoccus* spp. (Hemiptera: Matsucoccidae), as long-range kairomones. In the system of *E. hebraicus* and *M. josephi*, the prey sex pheromone appears to have other functions beside feed location. This hypothesis is based on the following observations: 1) pheromone traps placed in the forest attract larger numbers of males than females; 2) virgin as well as experienced adult *E. hebraicus* display a weak mating activity when a source of pheromone is absent in a laboratory cage*;* 3) mating activity of *E. hebraicus* is enhanced in the presence of *M. josephi* adult females in laboratory cages. Taking into account these observations, we suggest that the *M. josephi* pheromone serve *E. hebraicus* as an aggregation kairomone and as a sexual stimulant. The hypothesis was verified by studying in the forest the aggregation behavior of *E. hebraicus* and its mating frequency near a dispenser impregnated with the synthetic sex pheromone of *M. josephi,* and by observing the sexual behavior of the predator under laboratory conditions. Males and females of *E. hebraicus* rarely displayed courtship or mating activity in a laboratory cage. Their sporadic movements, in the cages, were restricted to searching for food. In contrast, sexual encounters took

place within minutes in the presence of *M. josephi* pheromone. In the forest, both males and females aggregated in an area of 20-40 cm of the bark surface surrounding the pheromone dispenser. More than 90% of the females that approached the bait were ready to mate, and the encounters between the sexes resulted in the mating pairs absconding. In general, *E. hebraicus* males avoided adult *Matsucoccus* females placed near the dispenser, whereas, the congregating females started to feed as soon as they had encountered their prey. We also studied the variation in 'ovigeny' of the attracted females before they could mate with the males nearby. No mature or visible immature eggs could be found. Females that were collected before mating around the dispenser and allowed to feed for 4 days in the laboratory developed 10-24 mature eggs. This suggests that most females attracted to the pheromone were already fertilized. Virgin females, even two weeks after their emergence, displayed strict synovigenity. Collected females, and individuals reared indoors avoided mating when their ovary contained 4 or more mature eggs. Development of mature eggs occurs only after feeding. Our findings suggest that adult *E. hebraicus* utilize the sex pheromone of *M. josephi* to locate mates and stimulates mating (*i.e.* acts as an aphrodisiac or indirectly simulates sexual behaviour through congregation).

In addition, females seem to be ready to mate several times prior to the development of mature eggs in their ovaries. The observed tendency of the females, unlike that of the males to leave the arena soon after they mate, may explain the male-biased sex ratio found in pheromone traps in the forest. The sexual behaviour of *E. hebraicus* is probably typical of other *Elatophilus* spp. that are attracted to the sex pheromones of *Matsucoccus* spp.