TRICHOGROMMA PLATNERI (HYM.: TRICHOGROMMATIDAE): HOST CHOICES BETWEEN VIABLE AND NONVIABLE CODLING MOTH, CYDIA POMONELLA, AND THREE-LINED LEAFROLLER, PANDEMIS LIMITATA (LEP.: Tortonidae) EGGS

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In laboratory host-preference studies, *Trichogramma platneri* Nagarkatti (Hym.: Trichogrammatidae) females, reared on viable codling moth, *Cydia pomonella* (L.) (Lep.: Tortricidae) eggs, parasitized significantly more viable than nonviable codling moth eggs produced by cobalt 60 irradiated adults. This ovipositional preference was maintained when competition increased per host egg. Similarly, one, three and five *T. platneri* females consistently oviposited more eggs into viable versus nonviable host eggs.

A single female *T. platneri* parasitized a similar number of viable *C. pomonella* and three-lined leafroller, *Pandemis limitata* (Robinson) (Lep.: Tortricidae) eggs. However, as the number of females per host eggs increased, a significantly larger number of codling moth versus leafroller eggs were parasitized. One, three and five *Trichogramma* females parasitized significantly more *P. limitata* versus nonviable *C. pomonella* eggs.

Nonviable *C. pomonella* eggs deflated to less than 25% of their original volume in four and ten days when held under dry and humid conditions respectively. The blackened prepupal stage of the parasitoid generally occurred in the nonviable *C. pomonella* eggs four days post-parasitization whereas the parasitized viable eggs blackened zero to one day earlier. Incubation under dry or humid conditions did not appear to influence the number of parasitized eggs that were able to blacken and show evidence of parasitism.

KEY-WORDS: *Trichogramma platneri*, *Cydia pomonella*, host choice, egg parasitoid.

A sterile codling moth, *Cydia pomonella* (L.) (Lep.: Tortricidae) release program was initiated in apple orchards of the interior of British Columbia, Canada, in 1994. Mating among the millions of sterile female and male moths released bi-weekly throughout the summer should result in millions of primarily nonviable *C. pomonella* eggs (Proverbs & Newton, 1962). The indigenous egg parasitoid, *Trichogramma platneri* Nagarkatti (Hym.: Trichogrammatidae) (J. Pinto, U. of California, Berkeley, pers. comm.) has been found to

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propagate in nonviable *C. pomonella* eggs from all potential sterile crosses (Cossentine *et al.*, unpublished data; Nagy, 1973) although lower oviposition and emergence from eggs from sterile females and/or males indicated nonviable eggs to be less suitable hosts than the viable *C. pomonella* eggs. Host suitability can be an important factor in host selection (Taylor & Stern, 1971). The potential of *T. platneri* to augment the sterile insect release program would depend on the preference of the female *Trichogramma* to parasitize viable *C. pomonella* or alternate host eggs versus the more abundant nonviable *C. pomonella* eggs available.

Laboratory host preference studies for *Trichogramma* species have employed individual or two parasitoids in a contained area with egg choices (Lewis & Young, 1972; Dijken *et al.*, 1986; Hassan, 1989, 1994). Recorded egg contacts at specific intervals and/or the capacity of the *Trichogramma* to parasitize the target host eggs over days of exposure have been used to express host preference. In the current study, we examined the preference of *T. platneri* females to parasitize viable *C. pomonella* versus nonviable *C. pomonella* eggs from the sterile female × male crosses, which should be the most abundant nonviable egg-type in orchards receiving sterile insects. In addition, we compared the preference of the *T. platneri* females to parasitize viable and nonviable *C. pomonella* eggs versus a probable alternate viable host in western North American orchards, eggs of the three-lined leafroller, *Pandemis limitata* (Robinson) (Lep.: Tortricidae).

**MATERIALS AND METHODS**

*T. platneri* were originally obtained from Rincon-Vitova Inc., CA and subsequently reared on viable codling moth eggs. Newly emerged fertile *C. pomonella* moths provided by the Sterile Insect Release Program in Osoyoos, B.C. were exposed to 307.5 krad gamma irradiation using a cobalt 60 source. These sterile male and female *C. pomonella* produced nonviable eggs on double-sided waxed paper. Fertile *C. pomonella* and *P. limitata* colonies oviposited viable eggs on similar paper.

Viable *C. pomonella* eggs are susceptible to *Trichogramma* parasitism for two days post-oviposition (Dolphin *et al.*, 1971) and *T. platneri* parasitizes the most *C. pomonella* eggs on its first day of exposure to them (Cossentine *et al.*, unpublished data). Consequently, our host preference trials exposed female *T. platneri* to < 24 h-old egg choices for their first 24 h post-emergence and mating.

The choice trials were conducted in inverted 100 × 15 mm plastic Petri dishes lined on the bottom with filter paper. Fifty viable and fifty nonviable *C. pomonella* eggs, < 24 hr post-oviposition, were cut as six mm diameter circles using a hole-puncher from the wax paper on which they were oviposited. The 100 total eggs in the choice test were sufficient to avoid superparasitism. Eggs were distributed randomly with the egg on the upper surface over the bottom of each of 15 Petri dishes. Freshly emerged *T. platneri* adults were allowed to mate for at least four hr before females were used. One, three or five *T. platneri* females were placed in each of five egg dishes. A honey and water moistened cotton wick was glued to the lid of the dish. The assay was incubated for 24 hr at 24°C before egg circles were removed, sorted as per viability and sealed in 30 ml plastic cups. The cups were incubated at 24°C.

Four d post-exposure, parasitism was assessed. At this early stage the number of *T. platneri* per host egg could be determined by counting the individual dark *T. platneri* bodies under the dissecting microscope even when the characteristic totally blackened parasitized egg surface was not completely evident. Fifteen days post-exposure parasitism was confirmed, and the parasitized host egg judged as emerged by the presence of at least one parasitoid hole per egg.