

INFLUENCE OF HOST EGGS ON THE ECOTYPES OF THE EGG PARASITOID *Trichogramma chilonis* ISHII

M. GANESH KUMAR, P.C. SUNDARABABU, Y.S. JOHNSON THANGARAJ EDWARD AND C. GAILCELEO JUSTIN.

Dept. of Agricultural Entomology, TNAU, Coimbatore.

ABSTRACT

Six ecotypes of *Trichogramma chilonis* collected from Gudimangalam, Palladam, Udumalpet, Pongalur, Chingleput and Mettupalayam, were compared with the laboratory strain of the same species (Coimbatore). All the ecotypes were significantly superior to the laboratory strain in parasitizing the eggs of *Corcyra cephalonica*, *Heliothis armigera* and *Spodoptera litura* and showed a distinct preference for *H. armigera* eggs. The Palladam ecotype was able to withstand starvation to a maximum extent of 6.86 days.

The increasing frequency of chemical pest control failures has directed the attention to biological pest suppression. The parasitoid, *Trichogramma* spp. has the unique advantage of killing the pest at the egg stage itself thus preventing damage by the pests. Mass production of the biocontrol agent when reared undergoes genetic and adaptive changes which affects its efficiency. Ashley *et al.* (1974) demonstrated the selection of *Trichogramma* strains for increased parasitisation rates and reported a decrease in field performance of strain of *T. pretiosum* in course of laboratory rearing (Ashley *et al.*, 1973). The present study was conducted with a view to evaluate the laboratory strain of *T. chilonis* in comparison with six field collected ecotypes of the same species.

MATERIALS AND METHODS

Six ecotypes of *T. chilonis* were collected from Gudimangalam (ET1), Pongalur (ET2), Udumalpet

(ET3), Palladam (ET4), Mettupalayam (ET5) and Chingleput (ET6) by exposing egg cards of *Corcyra cephalonica* Stainton from cotton and sugarcane fields and were compared with the laboratory strain at Coimbatore. The parasitized egg cards were brought to the laboratory and mass multiplied for three successive generations on eggs of *C. cephalonica*. The emerged adults were used for the following experiments.

C. cephalonica eggs were collected, sterilized and glued to cardboard strips 2.0 x 6.5 cm at 120 eggs per strip. These were kept in specimen tubes into which two mated females of the different ecotypes were released. The egg cards were offered separately at time intervals of 1, 3, 6, 9, 24 and 48 hr after collection. The treatments were replicated thrice. The percentage parasitism and emergence were calculated.

Eggs of *C. cephalonica*, *Spodoptera litura* (Fabr.) and *Heliothis armigera* (Hubner) were used

Table 1. Effect of host age on different ecotypes of *T. chilonis*.

Age	Per cent parasitism (Mean of three replications)						
	ET1	ET2	ET3	ET4	ET5	ET6	ET7
1 hr	82.50 AB (65.25) a	81.11 AB (64.21) a	82.50 AB (65.25) a	83.06 AB (65.67) a	81.94 AB (64.83) a	83.33 A (65.88) a	80.56 B (63.82) a
3 hr	80.56 A (63.81)	81.67 A (64.63) a	80.56 A (63.82) a	83.06 A (65.67) a	82.78 A (65.46) a	82.78 A (65.46) ab	81.11 A (64.21) a
6 hr	81.11 A (64.21) a	81.94 A (64.84) a	81.67 A (64.63) a	82.22 A (65.05) a	81.11 A (64.22) a	82.22 A (65.04) ab	82.22 A (65.04) a
9 hr	81.67 A (64.63) a	81.67 A (64.63) a	81.94 A (64.84) a	82.22 A (65.04) a	80.83 A (64.01) a	80.83 A (64.01) b	80.28 A (63.62) a
24 hr	75.00 AB (59.99) b	73.61 B (59.07) b	74.72 AB (59.80) b	77.22 A (69.51) b	75.00 AB (59.99) b	72.78 B (58.55) c	64.44 C (53.38) b
48 hr	66.67 D (54.73) c	67.78 CD (55.41) c	67.50 CD (55.23) c	74.17 A (59.44) c	71.67 AB (57.82) c	69.72 BC (56.60) d	61.94 E (51.89) b

In a column, means followed by same letter (lower case) and in a row means followed by same letter (upper case) were not significantly different by DMRT ($P=0.05$). Figures within parentheses are transformed values (angular transformation)

Table 2. Effect of host age on different ecotypes of *T.chilonis*.

Age	Per cent parasitism (Mean of three replications)						
	ET1	ET2	ET3	ET4	ET5	ET6	ET7
1 hr	81.39 A (64.42)a	80.28 A (63.61) a	82.22 A (65.04) a	82.50 A (65.25) a	81.39 A (64.42)a	81.39 A (64.42) a	79.72 A (63.22) a
3 hr	79.72 A (63.22) a	80.56 A (63.81) a	79.72 A (63.64) a	81.67 A (64.32) a	80.83 A (64.01) a	81.67 A (64.63) a	79.72 A (63.21)a
6 hr	80.28 A (63.61) a	80.28 A (63.62) a	78.89 AB (62.63) a	81.11 A (64.22) a	79.72 A (63.24) a	80.00 A (63.43) a	75.83 B (60.63)b
9 hr	69.44 C (56.42) b	69.17 C (56.25) b	69.44 C (56.42) b	80.00 A (63.43) a	73.89 B (59.25) b	73.06 BC (58.75) b	74.72 B (59.86) b
24 hr	70.28 A (56.95) b	65.28 B (53.87) bc	65.83 B (54.22) bc	74.17 A (59.44) b	70.83 A (57.32) b	70.56 A (57.14)b	57.22 C (49.14)c
48 hr	61.11 B (51.41) c	60.28 B (50.91) d	62.50 B (52.22) c	68.33 A (55.73) c	64.17 B (53.21) c	63.89 B (53.05) c	54.44 C (47.53)c

In a column, means followed by same letter (lower case) and in a row means followed by same letter (upper case) were not significantly different by DMRT (P=0.05). Figures within parentheses are transformed values (angular transformation)

for this study. In case of *S. litura*, fresh eggs were taken, scales removed and 120 eggs were pasted on each cardboard strip. In the case of *H. armigera* the egg-cloth was cut into bits so that 120 eggs could be isolated and were stapled together on individual cardboard strips. The egg cards was kept in specimen tubes and a pair of mated females were released per tube. The treatments were replicated thrice. The percentage of parasitism and emergence of adults were worked out. From the emerging adults, ten individuals were separated into separate tubes and observed for adult longevity.

RESULTS AND DISCUSSION

The maximum extent of parasitism and emergence was found in ET4 (80.32 % and 77.96 %). The other ecotypes parasitized 77.92 to 78.89 per cent and were statistically on par. The laboratory strain was significantly inferior to the rest, though there was 75.09 per cent parasitism.

The maximum parasitism was found when the host eggs were 1,3,6 and 9 hr. old but were significantly superior to 24 and 48 hr. old eggs of *C. cephalonica* (Tables 1 and 2).

All the ecotypes were significantly superior to the laboratory strain, with regard to the different host species. The maximum parasitism (82.42 %) and emergence (81.23 %) was noticed in case of *H. armigera* eggs and was significantly superior to the other hosts. The minimum parasitism was noticed in *C. cephalonica* showing its least preference (Tables 3 and 4).

Adults of ET4 were able to survive for 6.86 days without food. ET5 was the next best, living for 5.89 days but significantly inferior to ET4. The laboratory strain was able to survive only 1:81 days without food. The adults which emerged from *H. armigera* had the longest lifespan (5.13 days)

Table 3. Effect of host species on different ecotypes of *T.chilonis*.

Ecotype/ Host	Per cent parasitism (Mean of three replications)							Mean
	ET1	ET2	ET3	ET4	ET5	ET6	ET7	
<i>Heliothis armigera</i>	82.78 (65.46)	82.5 (65.25)	82.5 (65.26)	83.06 (65.67)	82.22 (65.04)	82.5 (65.25)	81.39 (64.42)	82.42 (65.19)a
<i>Spodoptera litura</i>	81.39 (64.43)	81.11 (64.21)	81.39 (64.43)	81.94 (64.84)	81.67 (64.64)	80.83 (64.01)	80.28 (63.61)	81.23 (64.31) b
<i>Corcyra cephalonica</i>	79.17 (62.82)	79.17 (62.84)	78.61 (62.45)	79.17 (62.83)	79.17 (62.82)	78.33 (62.24)	75 (59.99)	78.37 (62.28)c

In a column, means followed by same letter were not significantly different by DMRT (P=0.05). Figures within parentheses are transformed values angular transformation

Table 4. Effect of host species on the progeny of the different ecotypes of *T.chilonis*.

Ecotype/ Host	Per cent emergence (Mean of three replications)							Mean
	ET1	ET2	ET3	ET4	ET5	ET6	ET7	
<i>Heliothis armigera</i>	81.67 (64.63)	81.67 (64.63)	81.94 (64.84)	81.67 (64.63)	81.67 (64.63)	81.39 (64.43)	78.61 (62.43)	81.23 (64.31) a
<i>Spodoptera litura</i>	80 (63.41)	79.72 (63.21)	80.28 (63.62)	80.56 (63.82)	80 (63.42)	79.17 (62.82)	78.61 (62.43)	79.76 (63.25) b
<i>Corcyra cephalonica</i>	77.78 (61.85)	77.5 (61.68)	77.22 (61.49)	77.78 (61.86)	77.78 (61.86)	76.67 (61.1)	73.06 (58.72)	76.83 (61.22) c

In a column, means followed by same letter were not significantly different by DMRT ($P=0.05$). Figures within parentheses are transformed values (angular transformation)

Table 5. Effect of different host eggs on the longevity of adults of ecotypes of *T.chilonis*.

Ecotype/ Host	ET1	ET2	ET3	ET4	ET5	ET6	ET7	Mean
<i>Corcyra cephalonica</i>	4.73 a D	4.70a D	4.67a D	6.53b A	5.80a B	5.20b C	1.63a E	4.75b
<i>Heliothis armigera</i>	4.93 a C	5.07a C	5.00a C	7.63a A	5.90a B	5.37ab C	2.03a D	5.13a
<i>Spodoptera litura</i>	4.93 a C	5.00a C	5.00a C	6.40b A	5.97a B	5.77a B	1.77a D	4.98a

In a column, means followed by same letter (lower case) and in a row means followed by same letter (upper case) were not significantly different by DMRT ($P=0.05$).

without food and was significantly superior to the other two (Table 5).

In conclusion though the laboratory strain was continuously reared for several generations, there was distinct preference for the normal host as reported by Zabroski *et al* (1987) that in case of *T. minutum*, the rearing host had no influence on the response of the parasitoid to the scale of *Choristoneura fumiferana* while the ecotypes collected from the field had the ability to withstand starvation for almost seven days which is a distinct. The continuous rearing under controlled conditions on *C. cephalonica* has lead to the lowering of quality of the parasitoid. These results are in confirmity with the findings of Stein (1960) that the rearing host might influence the performance of

mass released *Trichogramma* spp and ultimately affect on the development rate, morphology, size, fecundity, longevity, sex ratio, locomotory capacity, searching capacity and host preference.

REFERENCES

- ASHLEY, T.R., D.GONZALEZ and T.F. LEIGH. 1973. Reduction in effectiveness of laboratory reared *Trichogramma*. *Environ. Entomol.*2: 1059-1073.
- ASHLEY, T.R., D.GONZALEZ and T.F. LEIGH. 1974. Selection and hybridization of *Trichogramma*. *Environ. Entomol.*3: 43-48.
- STEIN, W. 1960. Versuche zur biologischen Bekämpfung des Apfelwicklers (*Carpocapsa pomonella* [L.]) durch Eiparasiten der Gattung *Trichogramma*. *Entomophaga* 5: 237-259.
- ZABROSKI, E., P.E.A. TEAL and J.E. LAING. 1987. Kairamone-mediated host finding by the spruce budworm egg parasite *Trichogramma minutum*. *J. Chem. Ecol.* 13: 113-122.