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RESEARCH ARTICLE

PARASITISATION POTENTIAL OF TRICHOGRAMMA CHILONIS (ISHII) ON DIFFERENT HOSTS

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ABSTRACT

The present investigations were undertaken on laboratory studies of *Trichogramma chilonis* (Ishii) during the year 2013-2014 in the Bio-control laboratory, Department of Agricultural Entomology, College of Agriculture, Dapoli (Maharashtra).The results of effect of different hosts on parasitisation potential of *T. chilonis* revealed that the per cent parasitisation and per cent adult emergence of *T. chilonis* was found maximum on *S. litura* eggs followed by *C. cephalonica* and *H. armigera* eggs.

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INTRODUCTION

Trichogramma wasps, minute in size from the friendly insect fauna, are used as biological control agent against lepidopterous insects in integrated pest management of crops and vegetables (Nagarkatti and Nagaraja, 1977). It is a very aggressive parasitoid and has the ability to increase in number. *Trichogramma* are being used to control lepidopterous pests of cotton, cabbage, apple and tomato *etc.* (Smith, 1996). It is the widely used natural enemy of pests owing to its rearing abilities in insectaries and ravenous parasitising tendency on eggs of variety of target hosts. Among the several parasitoids successfully used in the pest management strategies, *Trichogrammatids* are one of the most important groups of bio agents with renowned interest for the suppression of lepidopterous pests all over in India. The genus *Trichogramma* and closely related *Trichogrammatoidea* parasitoids attack only on egg stage of the pest. More than 150 species of *Trichogrammatids*, are distributed throughout the world parasitising eggs of over 200 insect species belonging to mainly Lepidoptera, Coleoptera, Neuroptera and Diptera, the majority being Lepidoptera. They are observed in diverse habitats ranging from aquatic to arboreal.

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In India, about 26 *Trichogrammatids* are recorded; of which, *Trichogramma chilonis* (Ishii), *Trichogramma japonicum* (Ashmead) and *Trichogramma acheae* (Nagaraja and Nagarkatti) are of significant importance.

MATERIALS AND METHODS

To study the parasitisation potential of *T. chilonis* on different hosts like *Corcyra, Spodoptera* and *Helicoverpa*

Freshly laid, U.V irradiated 100 eggs of respective hosts were pasted separately and randomly on a small white paper card strip (4 x 3.5 cm) with the help of diluted gum which were then air dried and were served to 3 pre-mated freshly emerged females of and *T. chilonis* from mass culture in a small glass vial (7.5 × 7 cm) separately. After 24 h *i.e*, after parasitisation, the paper strips were removed and kept in a separate same size vial for further development of the parasitoid and following biological parameters of *T. chilonis* from respective host's trichocards were recorded separately.

Per cent parasitisation

Black coloured eggs were considered as the parasitised eggs, on the basis of which, per cent parasitisation of *Trichogramma* from respective hosts trichocards was determined.

Per cent adult emergence

Out of total parasitised eggs, the number of parasitoids emerged were counted and per cent adult emergence of the species was determined.

Sex ratio

To determine sex ratio the emerged adults were first killed by keeping them under refrigerator at 0 ^{0}C. From those killed adults, sexing was done by observing individual parasitoid under 10x hand lens based on the morphological characters, given by Nagarkatti and Nagaraja (1971) is as below.

T. chilonis

Male: Male was darker and usually smaller than female, with black colour short, round abdomen. Antenna was distinct, long, more plumose, with black long bristles. Dorsum of thorax was brown with black tinge.

Female: Female was pale in colour and larger than male. Body was yellowish orange, with tapering abdomen. Antenna was short, not distinct, was less plumose with few short bristles.

RESULTS AND DISCUSSION

Parasitisation potential of *T. chilonis* on different hosts

The host influences the growth and survival as well as the parasitisation, adult emergence and sex ratio etc., Thus one would expect improvement in their biological efficiency by rearing them on some suitable hosts. Hence to find out the biological efficiency of *T. chilonis,* on three hosts *viz*., *C. cephalonica*, *S. litura* and *H. armigera* were selected and following biological parameters were tested. The results are discussed under following sub headings.

Per cent parasitisation by *T. chilonis* on different hosts

The data revealed that among the host eggs offered, the parasitoid accepted eggs of all the hosts for parasitisation. Among the hosts accepted, maximum and significantly superior per cent parasitisation was noticed on eggs of *S. litura* (94.00 ± 1.00 %) which was highly preferred for parasitisation by the parasitoid, followed by *C.cephalonica* (74.33 ± 9.02 %) and minimum per cent parasitisation was noticed on eggs of *H. armigera* (39.00 ± 3.61 %) which was least preferred by the parasitoid.

Mehendale (2009) studied the effect of different suitable hosts egg for mass production of *T. chilonis.* Among the host accepted, maximum per cent eggs parasitised were noticed on *H. armigera* (94.98%) and *Melanitis leda ismene* (Cran) (94.97%) which were at par followed by *Earias vitella* (F.) (91.97%). Further, *S. litura* and *C. cephalonica* recorded 72.98 and 71.97 per cent parasitisation, respectively. Eggs of *Bombyx mori* (L.) were parasitised to the tune of 40.97 per cent while that of *Samia cynthia ricini* (Boisdual) 5.0 per cent. Parasitoid failed to parasitise minute eggs of *P. xylostella*. Puneeth *et al.* (2013) conducted studies on biocontrol efficacy and viability of *T. chilonis* on *C. cephalonica* and *S. litura* and revealed that the parasitisation rate of *T. chilonis* was found to be 61.17± 1.77 per cent on *C.cephalonica* eggs and 80.31± 3.34 per cent on the eggs of *S.litura*. Their findings support the present results. Present findings revealed that the parasitisation potential by *T. chilonis* was maximum on eggs of *S. litura* followed by *C. cephalonica* and *H. armigera*.

Per cent adult emergence of *T. chilonis* from different hosts

The data revealed that the maximum per cent adult emergence was noticed on the eggs of *S. litura* (96.45 ± 1.61 %) followed by eggs of *C. cephalonica* (78.52 ± 3.06%) and the least emergence was noticed by eggs of *H. armigera* (73.34 ± 6.21%) which was least preferred by the parasitoid. Dileep (2012) revealed that the maximum per cent adult emergence was noticed on the eggs of *S. litura* (90.13 %) and followed by eggs of *C. cephalonica* (89.48 %) which was at par with *S. litura.* Present findings also revealed the results as above. Present findings revealed that the maximum *T. chilonis* adult emergence was from eggs of *S. litura* followed by *C. cephalonica* and *H. armigera*.

Per cent *T. chilonis* female adults emergence

The data revealed that the maximum per cent female *Trichogramma* emergence was noticed on eggs of *S. litura* (84.16 ± 3.53 %) followed by eggs of *H. armigera* (81.31 ± 4.66%) and least from eggs of *C. cephalonica* (78.52 ± 3.59 %).

Table 1. Parasitisation potential of *Trichogramma chilonis* on *C. cephalonica*, *S. litura* and *H. Armigera*

S. No.	Biological Parameters	*C. cephalonica*	*H. armigera*	*S. litura*
1.	Mean per cent parasitisation	74.33 ± 9.02	39.00 ± 3.61	94.00 ± 1.00
2.	Mean per cent adult emergence	78.52 ± 3.06	73.34 ± 6.21	96.45 ± 1.61
3.	Mean per cent female adult emergence	78.52 ± 3.59	81.31 ± 4.66	84.16 ± 3.53
4.	Sex ratio (M:F)	0.21 : 0.78	0.17 : 0.81	0.15 : 0.83

The per cent female *Trichogramma* emergence on *S. litura* was significantly superior over per cent female *Trichogramma* emergence on *C. cephalonica* and *H. armigera.* Rathi and Ram (2000) recovered higher female population from emerged adults of *T. chilonis* from the eggs of *A. moorei* (74.90 %) followed by *E. vittella* (73.30 %), *H. armigera* (71.50 %) and lowest (68.70 %) from eggs of *C. cephalonica.* Dileep (2012) revealed that the maximum per cent female *Trichogramma* emergence was noticed on eggs of *S. litura* (67.35 %) and lowest on eggs of *C. cephalonica* (60.22 %). The per cent female *Trichogramma* emergence on *S. litura* was significantly superior over per cent female *Trichogramma* emergence on *C. cephalonica.* Present findings also revealed the results as above.

Sex ratio (M : F) of *T. chilonis*

The sex ratio was female biased on all the host eggs. The maximum female parasitoid recovery was noticed from *S. litura* eggs (0.15:0.83) followed by *H. armigera* (0.17:0.81) and less female parasitoid recovery was noticed from *C. cephalonica* eggs (0.21:0.78). Earlier work of Jalali *et al.* (1987) revealed that sex ratio in *T. remus* was 1:1.10 from *S. litura*, while 1: 0.86 from eggs of *C. cephalonica.* Mehendale (2009) recorded that sex ratio in *T. chilonis* was 1:1.40 and 1:1.30 in *S. litura* and *C. cephalonica* eggs recpectively. Dileep (2012) revealed that the maximum female parasitoid recovery was noticed from *S. litura* eggs (1:2.1) and less female parasitoid recovery was noticed from *C. cephalonica* eggs (1:1.53). Present findings also revealed higher females from eggs of *S. litura* and lowest from *C. cephalonica,* thus followed the results as above.

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