

**Farm Level Production
of *Trichogramma chilonis* on
Eri Silkworm Eggs and its Utility in
Tribal Areas**



**Y. Lalitha
Chandish R. Ballal
Sunil Joshi
A. N. Shylesha
B. S. Bhumannavar**



**National Bureau of Agriculturally Important Insects (ICAR)
H.A. Farm Post, Bellary Road
Bangalore 560024
Karnataka, India**

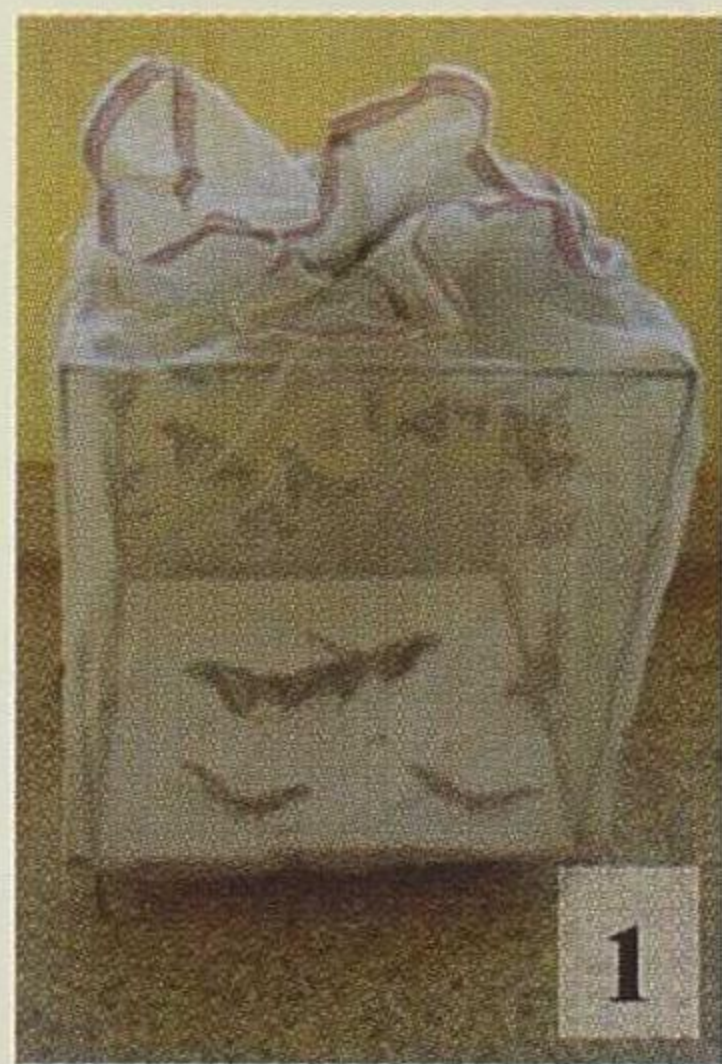
Trichogramma chilonis: Egg parasitoid *Trichogramma chilonis* is generally mass produced on the laboratory host; rice moth - *Corcyra cephalonica*. *T. chilonis* is field released to target several lepidopteran pests attacking various crops as indicated below:

Sl. No	Crops	Pests
1.	Paddy	Rice leaf roller / folder (<i>Cnaphalocrocis medinalis</i>); Rice stem borer (<i>Scirpophaga incertulas</i>)
2.	Sorghum	Sorghum stem / shoot fly (<i>Atherigona soccata</i>)
3.	Maize	Maize stem borer (<i>Chilo partellus</i>)
4.	Sugarcane	Internode borer (<i>Chilo sacchariphagus indicus</i>), Top borer (<i>Scirpophaga excerptalis</i>), Stalk borer (<i>C. auricilius</i>), Early shoot borer (<i>C. infuscatellus</i>), Root borer (<i>Polyocha depressella</i>)
5.	Cotton	American bollworm / Gram pod borer (<i>Helicoverpa armigera</i>), Spotted bollworms (<i>Earias vittella</i> , <i>E. insulana</i>), Pink bollworm (<i>Pectinophora gossypiella</i>)
6.	Sunflower	Head borer (<i>H. armigera</i>)
7.	Chilli	Fruit borer (<i>H. armigera</i>)
8.	Castor	Castor semilooper (<i>Achaea janata</i>)
9.	Okra	Fruit borers (<i>Earias vittella</i> , <i>E. insulana</i>)
10.	Brinjal	Shoot and fruit borer (<i>Leucinodes orbonalis</i>)
11.	Cabbage & Cauliflower	Leaf and head feeder (<i>Spodoptera litura</i>)
12.	Tomato	Fruit borer (<i>H. armigera</i>)
13.	Potato	Potato tuber moth (<i>Phthorimaea operculella</i>)
14.	Pomegranate	Fruit borer (<i>Deudorix isocrates</i>)
15.	Citrus	Citrus butterfly (<i>Papilio demoleus</i>).

Alternate host for production of *T. chilonis*:

In India, the rice moth *Corcyra cephalonica* is utilized as a laboratory host insect for mass production of trichogrammatids. Other host insects like *Sitotroga cerealella*, *Ephesia kuehniella* and *Helicoverpa armigera* have been utilized for rearing *Trichogramma* in different insectaries. Several steps are involved in the production system for *C. cephalonica*, which include moth collection, egg collection, egg sterilization and larval rearing. Some of the steps are mechanized. The parasitoids which emerge per parasitized egg ranges between one and four and the size of the parasitoid is observed to be inversely proportional to the number of the adults emerging from each egg. It is generally observed that the larger healthy adults have superior biological attributes and perform better in the laboratory and in the field. A method has been devised at NBAII for producing Eri silkworm (Esw) and using the eggs of Esw for producing *T. chilonis*. This method can be adopted for farm level production of *T. chilonis*.

Steps for rearing Eri silkworm

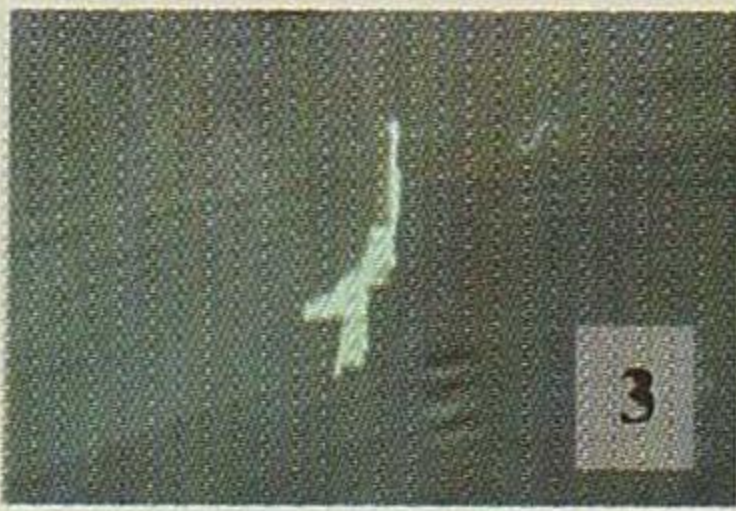


Adult rearing cage: A rectangular cage fabricated with iron rods measuring 40cm Length x 40cm Width x 45cm Height, with four legs measuring 6cm each and covered with nylon mesh and an opening (with a zip) on one side for releasing the moths (Figs 1 & 2).



Release the freshly emerged adults of Esw into the cage (Figs. 1 & 2).

Higher level of humidity can be maintained by placing the adult cage in a tray of water / wet sponge.



Adults live for 4 to 5 days, laying about 250 - 300 eggs during its life time. Egg masses are laid on the inner walls of the cages (Fig. 3).



Manually collect the egg masses by dislodging the eggs from the walls of the cages (Fig. 4).



Keep few egg masses at room temperature for continuing the host culture. The eggs hatch in 7 to 10 days. Provide tender castor leaves as feed for the freshly hatched larvae or neonates of Esw in pearl pet jars or in plastic trays covered with black cloth (Fig. 5). Clean the jars and provide fresh leaves daily.



Provide fresh leaves thrice in a day for early instar / growing larvae in the cages / plastic trays (Fig. 6).



Coarse / Mature leaves should be provided for the later instars / mature larvae (Fig. 7).



Cocoons are formed either with fed leaf bits or in the corners of the trays in 25 to 35 days (Fig. 8).



Collect the cocoons and keep them in cages for adult emergence (Pupal period 15 to 19 days) (Figs. 9 & 10).



Precautions

Gentle handling of all stages of Eri silkworm

Regular cleaning of jars / trays / cages

Avoid over-crowding of larvae in the jars / trays / cages

Grouping of larvae based on size

Wearing surgical masks and gloves while handling adults / collecting eggs and cleaning the cages

Rearing of *T. chilonis* on Esw eggs



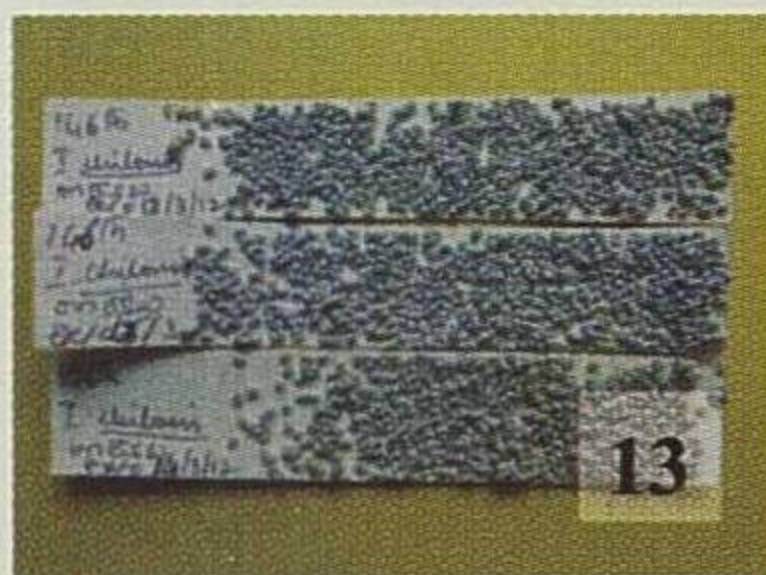
Store Esw egg masses in the refrigerator, wash the refrigerated egg masses gently under tap water followed by treatment with KOH solution and wash again under tap water



Dry the egg masses at room temperature, manually separate the eggs from the egg masses and store the dried loose eggs in the refrigerator. Paste the loose eggs

manually onto a card (in a marked area of 8 x 12 cm) with glue and allow for drying.

Introduce the above card (with Esw eggs) into a balloon made of polythene cover provided with fine streaks of 50% diluted honey as feed for the adults of *T. chilonis*. Mated females of *T. chilonis* parasitize the eggs of Esw (Figs. 11 & 12).



The parasitized eggs turn black in 7 to 8 days (Fig. 13).



T. chilonis adults emerge in 9 to 11 days @ 20 adults from each parasitized egg (Fig. 14). These adults can live for a week and successfully parasitize pest eggs.



As per need 1/5th portion of the parasitized Tricho card can be introduced into a fresh balloon made of polythene cover provided with fine honey (50%) streaks for continuing *T. chilonis* production (Figs. 15 & 16).



Each Tricho card will contain approximately 1200 parasitized Esw eggs. This card can be split into 16 bits, each bit containing approximately 75 eggs. For field release, Tricho card bits can be enclosed in a nylon mesh pouch (to



prevent predation) and can be stapled on to the lower surface of leaves (Fig. 17).

The sixteen Tricho bits can be uniformly distributed in one acre of the crop, resulting in a release rate of approximately 20000 adults per acre.

The Esw - Tricho cards can be safely stored in the refrigerator for 15 to 20 days for future field releases

Advantages of rearing *T. chilonis* on Esw eggs

- Higher yield of *Trichogramma* adults from each parasitized egg of Esw in comparison to *Corcyra*
- Production of robust adults with superior biological attributes
- Higher female progeny production; females with higher fecundity and better searching ability
- Low production cost and amenable for adoption by farmers.

For more details contact:

The Director, NBAII, PB NO.2491, H. A. Farm Post, Bellary Road, Bangalore 560024, Karnataka, India