Emergence potential of *Nesolynx thymus* Girault and environmental impact

Uzi fly, *Exorista bombycis* (Louis) is an endo-larval parasitoid on silkworm, *Bombyx mori* L. and other lepidopteran species (Narayanaswamy and Govindan, 2000) causing considerable damage to silkworm rearing in several silk producing countries including India. Scientists and farmers have adopted various control measures to manage Uzi fly, but these measures are not sufficient to control Uzi infestation. The incidence of Uzi fly, *Exorista bombycis* is maximum in the month of March and April, in the western parts of Maharashtra and becomes epidemic. A total of 10 districts were affected by this deadly pest of silkworm (*Bombyx mori*). Farmers lose 20-30% cocoon production (Anon., 2008).

Biological control is being used for the control of many insects' pests either individually or as a part of integrated pest control programme. Control of Uzi fly through biological means (hyper parasitoids) has a special relevance, since the host itself is an insect and insecticidal measures cannot be taken against a pest associated with an insect host. Therefore, it is important to increase the use of effective biological control agents that can efficiently control the Uzi fly, which being safe for the environment, user friendly and affordable to farmers.

*Nesolynx thymus* a hymenopteran parasitoid was first discovered and utilized to control the Uzi fly, *E. bombycis* during 1985 (Kumar *et al*., 1986). Since then, this parasitoid has been used in India for controlling Uzi fly infection on *Bombyx mori*. In order to increase *N. thymus* success in biological control, it is important to elucidate the interactions between the parasitoid and its host including the effects of the host on parasitoid development.

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<tr>
<th>Sl. No.</th>
<th>Host age (days old)</th>
<th>% of parasitization</th>
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<tr>
<td>1.</td>
<td>0</td>
<td>80</td>
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<tr>
<td>2.</td>
<td>1</td>
<td>75</td>
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<tr>
<td>3.</td>
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<td>4.</td>
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Table 1. Parasitization rate according to host age of housefly, *Musca domestica*

*Nesolynx thymus* completes its life cycle in 10-12 days on Uzi fly host. Longevity of adult hyper parasite recorded is 6-8 days. Adults of *Nesolynx thymus* mate within 8-10 hrs of emergence. Males and females mate more than once. On parasitization, the larvae of *N. thymus* feed within the host pupae, develop rapidly and attain full growth (Kumar *et al*., 1986). Use of *Nesolynx thymus* in varied environmental conditions is a difficult task, as the rate of parasitism and its emergence potential depends on number of factors, viz., host age, host density, temperature, RH etc. (Hasan *et al*., 1998). Under laboratory condition when maggots and pupa of Uzi fly, house fly and silkworm were exposed to *N. thymus*, Uzi fly and house fly were readily parasitized and the adult were recovered.

The mass production of *N. thymus* was initiated in the laboratory of Vidya Pratishthan's School of Biotechnology (VSBT), Baramati from Jan.2009 by method of Katiyar, and Datta (2001). House fly was used for mass production of *Nesolynx thymus* instead of Uzi fly because of similar life cycle is cost effective.

A total of 750 *N. thymus* adult flies were released on 3000, 1-4 days old house fly pupae in the ratio of 1:4 at the interval of 24 hrs (Aruna and Manjunath, 2009). The rate of parasitization was studied by observing the percentage of infested housefly pupa and progeny recovery.

Adult *N. thymus* inoculated on the house fly pupa in the ratio of 1:4 in trays and trays were incubated at different temperatures (10, 15, 20, 25, 30, 35, and 40°C) and Relative Humidity (10, 20, 30, 40, 50, 60, 70, 80, and 90%). These incubated trays were observed for 3 days and parasitization rate, emergence of *N. thymus* was recorded.

To study the effect of host age on rate of parasitization, adult *N. thymus* were released on housefly pupae at the ratio of 1:20 on 1-4 days old housefly pupae. The rate of parasitization and progeny recovery was studied by calculating the percentage of infested pupae and emergence of housefly from the pupae and presented in table 1.

The results indicated that the lower temperature has adverse effects on *N. thymus* development and emergence.
Fig. 1. Effect of temperature on parasitization rate and emergence potential of *Nesolynx thymus*.

Fig. 2. Effect of Relative humidity on parasitization rate and emergence potential of *Nesolynx thymus*.

Fig. 3. Parasitization rate of *Nesolynx thymus* on different days of Uzifly pupa.
potential. The rate of parasitization was found to increase with increase in temperature up to 25°C. Further, increase in temperature beyond 25°C decreases the parasitization rate and emergence potential (Fig. 1). The parasitization rate was highest at 25°C while emergence was maximum at 20°C. At constant optimum temperature, the parasitization rate increases with increase in humidity (Fig. 2.).

It was observed that host age plays a very important role in parasitization rate of *N. thymus*. After the release of *N. thymus* on 1-4 days old house fly puparia the 80 percent parasitization was observed on just pupated pupa.

The rate of parasitization decreased with increase in the pupal age. Four day old puparia showed lowest parasitization rate. Similar results have been reported by Aruna and Manjunath (2009). On Uzi fly, *N. thymus* recorded maximum parasitization on first and second day old pupa. (Fig. 3)

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References


The observations made on the effect of seasonal variations with respect to the temperature and humidity on rate of parasitization indicated that during September (58.9%) and October (60%) the rate of parasitization was highest (Table-2). During these months the temperature and humidity was 26°C and 83-84 percent respectively. Hasan et al. (2009) also recorded highest progeny production in *N. thymus* at 25°C and supports the current observation.

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