ISSN 0971-930X
Journal of Biological Control
Published by Society for Biocontrol Advancement (Copyright 2000 SBA)

Journal of Biological Control, 26 (1): 77-79, 2012

Research Note

Efficacy of transported biocontrol agent *Nesolynx thymus* (Girault) in controlling Uzi fly infestation in the silkworm *Bombyx mori* L.

D. V. BHAT

Basic Seed Farm, National Silkworm Seed Organization, Central Silk Board, Mangalam, Yelagiri Hills – 635 853, Tamil Nadu, India.
Corresponding author E-mail: anudivas54@yahoo.in

ABSTRACT: Uzi fly, *Exorista bombycis* has been reported to cause 10 to 20% loss to the sericulture industry in southern India. An integrated package with the release a parasitoid of the uzi fly, *Nesolynx thymus* has been advocated by the researchers to contain the damage by *E. bombycis*. The present study was undertaken to evaluate the efficacy of release of long distance transported biocontrol agent in controlling the uzi infestation and to find out whether it is economically viable. The results indicated that the release of transported biocontrol agent not only reduced the uzi infestation in the silkworm crops from 0.5% to 0.2% but also is economically viable.

KEY WORDS: Dfls, parasitoid, spinning, courier service, fifth instar

(Article chronicle: Received:29-4-2011 Revised: 28-10-2011 Accepted: 21-2-1012)

Uzi fly, *Exorista bombycis* (Luis), a tachinid fly has well established itself in southern states of India and can cause from 10 to 20 % loss to sericulture industry if uncontrolled (Dandin *et al.,* 2001). An integrated management concept has been advocated to control this pest which includes cultural/mechanical, exclusion, chemical and biological methods. The latter method involves release of large quantity of parasitoids of the uzifly to reduce the degree of infestation (Kumar *et al.,* 1990, 1993; Jyothi *et al.,* 1993; Narayanaswamy and Devaiah, 1998). This is efficiently done by *Nesolynx thymus* (Girault) an indigenous hymenopterous ecto-pupal parasitoid which possesses various desirable attributes such as shorter life cycle, amenable to mass production under laboratory conditions, high parasitization potential, and efficient host seeking ability and is recommended as a preferred biocontrol agent (Aruna and Manjunath, 2006). In addition, its control in pure breeds is more important as its infestation in enhanced the stress related metabolic activities and led to severe damage to the productivity level (Venkata Reddy and Radhakrishna, 2009). The actual method requires release of large number of *N.thymus* adults for each rearing cycle (one lakh adults for every 100 laying rearing) coinciding with the fifth instar, spinning and harvesting stages of the rearing cycle.

Mass multiplication of *N. thymus* requires well planned laboratory facilities and proper methodology. Commercial quantity of the parasite is available only in few places where advanced facilities are developed. Hence, they have to be transported from production units to rearing houses located at distant places. Reports on the efficacy of transported parasite in controlling Uzi infestation in silkworm is lacking. The present study was undertaken to evaluate the efficacy of transported *N. thymus* release and its commercial viabililty.

The present study was undertaken during 2009 and 2010. Larvae of *B. mori* were multiplied at regular intervals as per the standard procedure advocated by the breeders for race maintenance (Datta *et al.*, 1996). New silkworm breeds like CSR2, CSR4 and CSR27 which are currently used in the field were used for the experiment. During each multiplication cycle referred to as a crop, a schedule of *N. thymus* release was planned by procuring the *N. thymus* from Central Sericultural Research and Training Institute, Mysore (CSR&TI) located at a distance of 350 km. from the experimental station. Immediately after initiating the silkworm crop, information was sent to the pest management laboratory of CSR&TI, Mysore for the required quantity of parasite along with details on date of initiation of crop, quantity of seed (silkworms) under rearing etc. The quantity of parasiticized host pupae required for each crop was decided by the laboratory and the material was dispatched to the center, in nylon pouches packed in

perforated cardboard boxes through courier service. As soon the material was received at the center, the same was distributed in the rearing house by hanging the pouches at the rearing stands. The *N. thymus* adults emerged from the nylon pouches coinciding with the later instar larvae and infested the uzi maggots available in the silk worm rearing environment. The pouches were retained in the rearing room till the silkworms completed the cocoon formation.

The cocoons were harvested after one week of complete formation of the pupae. One kilogram of seed cocoons were picked up randomly from the harvested cocoons, counted the number of cocoons in kg. Then all the cocoons were cut opened and sorted into cocoons containing uzi infested and non uzi infested pupae. The percentage of uzi infestation was calculated.

Decrease in the uzi infestation in the cocoons was is reflected in the increased pupation rate of the seed cocoons and hence increased purchase rate (Action Plan, 2010-2011). While calculating the financial implications Rs. 300 per kilogram was taken as the standard rate for seed cocoons and only direct benefit is analysed ignoring the indirect benefits to the industry. The direct benefit is to the farmer where in reduced uzi infestation fetches him more returns to the cocoon crop that he has harvested by increasing the productivity. Indirectly, reduced uzi infestation leads to better recovery of silk in commercial cocoons and higher recovery of seed in seed cocoons by increasing the good cocoon percentage.

Uzi fly infestation recorded over a period of two years (2009-2010) is presented in Table 1.

Table 1. Efficacy of *Nesolynx thymus* in controlling Uzi fly infestation in the silkworm *Bombyx mori*

Groups	Percentage of uzi infestation (mean ±SE)
Control	0.475 ± 0.053
N. thymus released	0.168 ± 0.062**

**Significant at $P<0.01$

During each year 5 silkworms crops were taken and during each crop race, number of dfls reared, date of initiation of the crop (brushed on date) no of silkworms reared, cocoons harvested by number and by weight, no. of *N.thymus* pouches used, no. of approximate *N.* adults released, no. of cocoons assessed for uzi infestation and number of Uzi infested pupae is recorded. In the treated batches the percentage of uzi infestation varied from 0.0% to 0.3 % over a period of one year, where as in control batches the infestation varied from 0.3% to 0.7%. Zero infestation was recorded in three observations under treated group. The exclusion method and the mechanical methods as indicated in the integrated package for uzi fly control are followed by default in each silkworm rearing (Kumar *et al.,* 1993) both in control and treated batches which may explain the nil infestation in one crop under treatment. The reduction in uzi infestation in treated batches was higher and indicated that release of *N. thymus* was effective in controlling the infestation to a significant level. Earlier studies have also established that the degree of uzi fly infestation has come down when *N. thymus* was used in the silkworm rearings of farmers as a part of integrated package (Pradeep Kumar *et al.,* 1991; Sathyaprasad *et al.*, 2006). Release of *N. thymus* even in Tasar silkworm rearing (wild) is reported to reduce the uzi fly infestation from 65.0 to 81.6% depending on the places of release (Ramkishore *et al.*, 2008).

The economics of release of *N.thymus* as a biocontrol agent for uzi fly control is worked out as below:

Total cocoons harvested without *N.thymus* during the experimental period = 644166

Decrease of uzi fly infestation with *N.thymus* release during the period (%) = 0.3

Anticipated increased cocoon yield (No) owing to *N.thymus* release = 1932

Anticipated increased cocoon yield (kg) owing to *N.thymus* release = 2.900 kg

Rate per kg of seed cocoons = Rs. 300.00

Total value of increased quantity of cocoons = Rs. 870.00

Total cost of *N. thymus* including cost of transportation = Rs. 800.00

Net value addition due to release of *N. thymus* = Rs. 70.00

The advantage of *N. thymus* release was calculated on the basis of anticipated increase in cocoon yield owing to use of biocontrol agent. A net amount of 70.00 rupees was gained during the period of the study including cost of *N. thymus* infested pupae and its transportation. The results clearly indicated that *N. thymus* is efficient in reducing the uzi fly infestation in silkworms crops even when they were transported over a long distance before their release.

AKNOWLEDGEMENTS

The authors extend their sincere thanks to The Director, National silkworm Seed Organization for allowing undertaking this work and The Director, Central Sericultural Research and Training Institute, Mysore for timely supply of required quantity of *N.thymus*.

REFERENCES

Action Plan (2010-2011). National Silkworm Seed Organization, Central Silk Board, Bangalore, India.

Aruna A. S., Manjunath D. 2006. Suitability of age of *Exorista bombycis* (Louis) for the breeding of the parasitoid *Nesolynx thymus* (Girault) (Hymenoptera: Eulophidae). *Indi J Seric.* **45**:149–154.

Dandin SB, Jayaswal J, Giridhar K. (Eds.). 2001. Silkworm Diseases and Pests and control measures, in: *Handbook of Sericulture Technologies*, (2nd ed.) Central Silk Board, 2001 pp. 251–254

Datta RK, Basavaraja HK, Yasuhisa M. 1996. *Manual on Bivoltine Rearing, race maintenance and race multiplication*, JICA Bivoltine Sericulture Technology Development Project, Central Sericultural Research and Training Institute, Mysore.

Jyothi HK, Nirmala MR, Geethabali, Veeranna G. 1993. Relative efficacy of parasitoids of uzi fly as biocontrol agents, pp 107–115. In *Recent Advances in uzi fly Research, Proceedings of the National Seminar on uzi fly and its control*, January 16–17, 1992, Karnataka State sericulture Research and Development Institute Bangalore, India.

Kumar P, Kishore R, Sengupa K. 1990. Parasitoids of uzi fly, *Exorista sorbillans* Weildman (Diptera:Tachinidae) XI: Degree of seasonal parasitization of the puparia of uzi fly by *Trichopriya* species (Hymenoptera: Diapridae). *Ind J Seric.* **29**: 188–193.

Kumar P, Manjunath D, Prasad KS, Ramkishore KV, Datta RK. 1993. Integrated management of the uzi fly *Exorista bombycis* Louis (Diptira: Tachinidae) a parasitoid of the silkworm *Bombyx mori* L. *Int J Pest Manag.* **39**: 445–448.

Narayanaswamy KC, Devaiaha MC. 1998. *Silkworm uzi fly*, Zen Publishers, Bangalore, India, p. 232.

Pradeep Kumar, Ram Kishore, Jayaprakas CA, Sengupata K. 1991. Parasitoids of uzi fly, *Exorista sorbillans* Weismann (Diptera:Tachinidae) XII : Studies on the efficacy of *Nesolynx thymus* (Girault) at the field level. *Ind J Seric.* **30**: 161–162.

Ram Kishore, Sharma SP, Debanath AK, Surj Prasad, Dey S B, Kaeisa J, Suryanarayana N. 2008. Field evaluation of integrated package to control uzi fly, *Blepharipa zebina* Walker (Diptera:Tachinidae) an endoparasitoid of the tasar silkworm. Emerging trends of research pp. 257–268. In Goel, S. C. Ed). *Insect Pest Management and Environmental Safety*, Vol. I.

Sathyaprasad K, Shekar MA, Vinod Kumar, Kariappa BK, 2006. Comparative field efficacy of different management packages against the uzi fly, *Exorista bombycis* (Louis) (Diptira:Tachinidae) a parasitoid of the silkworm, *Bombyx mori* (L). *Ind J Seric.* **45**: 51–54.

Venkata Reddy M, Radhakrisna K. 2009. A comparative study on energetics in three silkworm races of the silkworm *Bombyx mori* (L) infested with Uzi fly *Exorista sorbillans* (Weismann). *Ind J Seric*. **4**8: 21–28.