Biological Forum – An International Journal **6**(1): 1-4(2014)

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Host infestation Potentiality of *N. thymus* to Control the Uzifly of muga silkworm, *Antheraea assamensis* (Helfer) – A Bio-control Tool for Controlling Uzifly

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(Received 05 October, 2013, Accepted 20 December, 2013)

ABSTRACT: Muga silkworm, *Antheraea assamensis* (Heilfer), which produces the golden yellow silk is reared outdoor on two primary food plants; som (*Persaea bomycina* King) and soalu (*Litsaea monopetela*). It completes six crop/annum with two commercial crops *viz.*, Spring (May-June) and Autumn (October-November) and each commercial crop is preceded by pre-seed crops and seed crops. Owing to its inherent outdoor mode of rearing and multivoltinism, the silkworm is exposed to a complex of pest and predators and diseases during rearing period, especially in pre seed and seed crops. It is observed that during winter seed crops *viz.*, Aghenua (November-January) and Chotua (February-March), uzifly (*Exorista philippinensis* and *Blepheripa zebina*).

Key Words: Seed, crops, muga silkworm, hyperparasitoids, pests, predators.

INTRODUCTION

The pest status of muga silkworm, *Antheraea assamensis* is complex and it plays a major role in limiting the production of silk. Like diseases the muga silkworms are also exposed to several pests and predators in different seasons and the intensity of crop loss are also varied from season to season. Depending on intensity of pest & predators they are classified as major and minor. Among different pests (predators & parasites) reported on muga silkworm, two species of uzifly, *Blephripa zabina* Walker is the major Tachniid parasitoids attacking muga silkworm particularly during December-April causing 48.7 to 80 % loss in seed growing areas of Assam. In India, information on management of uzifly on muga silkworm is scanty. Pest management keys play a major role in increasing the production and productivity of muga silk. As muga silkworm is reared outside on the primary host plant, *Persea bombycina* (Family Lauraceae) and attacked by uzifly. Mass multiplication of *Exoristobia philippiensis / N. thymus* and local parasitoid within a radius of 1.0 km at different locations in the farmers' field is to minimize the uzifly infestation for increasing the production of cocoons of muga silkworm.

MATERIAL AND METHODS

Parasites

Uzi fly: *Exorista sorbillans* and *Blepharipa zebina* (Diptera : Tachinidae) are tachinid fly causes considerable damage to the muga silk industry accounting for 20-40% and 80-90% loss in seed growing areas during winter and post winter (December-March) months in upper and lower Assam respectively is a major pest.

***Nature of damage of uzifly*:** The gravid female parasitic fly lays 250-300 eggs an average of 30-40 on a single host & hatching takes place within three days of oviposition. The fly prefers to lay eggs on the body of the 4t & 5^{th} stage worms. The maggots bore into the body of the silkworm larva leaving a black scar at the entry point and started growing feeding silkworm fluid. The mature maggot comes out by making hole in the cocoon shell after killing the pupae. The maggot pupates inside the soil. In case of heavy infestation in the early 4^{th} stage the worms do not spin cocoons but later stage infestation allows the worms to spin cocoons.

Hyperpasitoides:

***Behavioral aspects on Nesolynx thymus*:** Behavioral study has been done in respect of host infestation potentiality, host searching ability and parasitization. Uzifly pupae infested more than other pupae and 219 numbers of emerged parasitoid (*N. thymus*) recorded from a single uzifly pupa (Table 1). During host searching ability, the searching ability was recorded vertically and horizontally. It was observed that horizontally 50-200 mtr and vertically 0.5 cm were found more effective in searching host (Table 2.) (Choudhury and Sonowal, 2000-01).

***Host infestation potentiality*:** A single gravid fly could infest 2-3 maggot of uzifly.

Table 1. Emergence of hyperparasoitoid from single pupa.

S. No.	Types of host pupa	No. of parasitoid emerged from single pupa
1.	Uzi pupa	219
2.	Flesh fly pupa	150
3.	House fly pupa	27

Table 2. Host searching ability of *Nesolynx thymus.*

Distance	**Vertically**	**Horizontally**
0.5 cm	52%	
1.0 cm	4%	
50 mtr	-	46%
100 mtr	-	40%
150 mtr	-	40%
200 mtr	-	36%
250 mtr	-	23%

Table 3. Comparative studies on biological characteristics of hyperparasitoids of uzi fly parasitizing muga silkworm.

Hyperparasitoid	**Life cycle (days)**		**Progeny Production / Pupa (no)**	**Sex Ratio M:F (no)**	**Parasitization potentiality/ Female (no)**
	S	W			
E.P.	17-19	50-54	60-80	1:10-1:20	4-7
N.T.	14-16	40-45	100-150	1:8 – 1:26	6-8

S : Summer; W: Winter; E.P. = *Exoristobia philippinensis* (Local); N.T. = *Nesolynx thymus*

RESULT AND DISCUSSION

For effective suppression of uzifly infestation in mulberry silkworm, an IPM package comprising of an ovicide (i.e. uzicide, a liquid formulation of 1 % benzoic acid) against eggs, augmentative release of indigenous gregarious (*N. thymus*) and solitary (*Dirhinus* sp.) parasitoids against pupae and dusting of diflubenzuron (Dimilin) on maggots/puparia to suppress the reproductive efficiency of the adults, has been recommended (Kumar *et al*, 1991). Among different parasitoides *N. thymus* was found efficient parasitoid followed by *Spalongia endieus* (Pteromalidae) and *Brachymeria lasus* (Chalcididae). The highest parasitisation of 55.1-64.1 % was observed in *N. thymus* followed by *S. endieus* (25.2-33.9 %) and *B. lasus* (10.3-11.9%) (Kishore *et al*., 2004) in mulberry silkworm. Prasad *et al*. (2006) have developed an IPM package for uzifly in silkworm, the results showed that the highest reduction (83.68 %) in uzifly incidence was recorded by adopting a package (uzicide + uzitrap + *N. thymus*) followed by uzicide+ *N. thymus* (76.14 %), uzicide + uzi trap (73.95 %) ad uzitrap + *N. thymus* (47.55%).

As muga silkworm is reared outside on tree in natural condition and pest & predators attacks muga silkworm.

Muga silkworm is sensitive to chemicals, so any insecticides or pesticides cannot be utilized to control uzifly during rearing period. Infestation potentiality of *N. thymus* was studied (Choudhury and Rajkhowa, 1996-97). Seasonal variations of *N. thymus* life cycle was also studied and was found that life cycle is completed within 14-16 days during July – August and 40-45 days during January – February (Choudhury and Rajkhowa, 1997-98).

In this regard, a research has been conducted on host potentiality infestation of *N. thymus* for controlling uzifly in muga silkworm is found 42.2 % at RMRS, Boko and at farmer's field 62.1% (Choudhuryand Sahu, 2002-03) (Table 4.) (Fig. 1-6).

Release of parastitoid, *Exoristobia philippiensis* at Regional Muga Research Station (RMRS), Boko throughout the year (2005-06) and mass release of the same during Jarua crop (Pre seed Crop, Nov-Dec) resulted in complete control of uzifly infestation. Similarly, trial conducted at two farmers' field near Boko during the Jarua crop 2005 recorded 4.44-15 % uzifly infestation against 50-60 % infestation under normal conditions (Sahu, 2005-06).

After conducting all studies, it is observed that *N. thymus* is an effective biological control agent for controlling uzifly.

Table 4. Population of hyperparasitoid and infestation of uzifly.

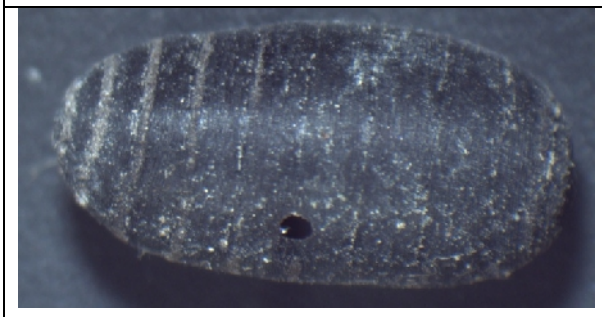
Treatments (Rearing)	Population studied	Infestation		Gain over control %
		No. of worms	%	
RMRS, Boko (Treated)	1500	635	42.2	20
Control (farmers field)	1500	931	62.1	
CD at 1%			7.46	

1. Uzifly laid eggs on muga silkworm.

2. White color egg of uzifly.

3. Fresh uzifly pupa.

4. Inside immature stage of hyperpasitoid.



5. After emergence of hyperpasitoid from uzifly pupa.

6. *N. thymus* after emergence from uzifly pupa.

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