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Economical and distributional status of UZI fly Exorista sorbillans Wied (Diptera: Tachinidae) in sericulture in India

KEYWORDS: Uzi fly Exorista sorbillans, Economics, distribution, control

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ABSTRACT *The Uzi fly Exorista sorbillans Wiedmann (Diptera: Tachinidae) is serious endoparasitoid of the mulberry silkworm Bombyx mori L. which caused mortalities in B. mori ranging from 8% to 80% in sericultural states of India. It was prevalent in Karnataka, Andhra Pradesh, Tamil Nadu, West Bengal, Assam, Maharashtra, Madhya Pradesh and Jharkhand. In Karnataka E. sorbillans infested 80 % silk worms and in Tamil Nadu and Andhra Pradesh it ranged from 30% to 40%. Uzi fly also caused mortalities in silkworms with high per cent in sericulturally nontraditional states like Maharashtra and Madhya Pradesh. For its control and dissemination prevention in virgin area, needs adoptation of preventive and curative measures.*

INTRODUCTION

Sericultural agro industry is worth for generating foreign currency and uplifting socio economic status of farmers in India. India produces all six known kinds of silks namely mulberry, oak, tasar, tropical tasar, eri and muga. About 8 lakh families and over 53,000 villages are actively engaged in coccon production in sericulture. India ranks second in row mulberry silk production in the world but very poorly. There is a tremendous gap in silk production between India and sericulturally first ranked country China (Dandin, 2006). In mulberry sector, high yielding (60 MT foliage/ year) varieties for irrigated conditions have been developed. Superior hybrids of silkworm of bivoltine, cross breeds and double hybrids have been evolved (Dandin, 2006). However, expected yield in mulberry silk coccon production has not achieved so far because of the diseases and pests of silkworms. Dermestid beetles, Xanthopimpla and Uzi flies are very potential pests of silkworms at rearing stage. Out of which Uzi flies Exorista bombycis and Exorista sorbillans are very serious pests in India which paralyzed sericultural industry of India and several other sericultural countries. Outside India, sericulture is practiced in more than 60 countries of the world (FAO, 2006). Review of literature indicates that Uzi flies have been studied with respect of biology, reproductive potential and control measures by several workers (Ayuzawa et. al., 1972; Tashio and Kobayashi, 1978; Anomymous, 1981; 1982; Patil, 1983; Siddappaji, 1985; Mahadevappa, 1992; Narasimha rao et. al., 1993; Devaiah and Patil, 1994; Saratchandra, 1997; Sathe and Jadhav, 2001; Thite et. al., 2005; Dandin, 2006; Jadhav et.al., 2014 etc).

MATERIALS AND METHODS

Distributional record of E. sorbillans was studied by visiting various sericultural states in India and sericultural districts of Maharashtra during the years 2012-2013. Silkworm rearing houses infected with E. sorbillans were noted in each states and districts. The per cent mortality caused by E. sorbillans to B. mori was calculated by taking into account of DFLS provided to farmers and actual mortalities caused by Uzi fly out of 100 individuals and based on questionnaires of sericultural farmers. Farmers have been advised to adopt Uzi preventive mesh to windows and other ventilators. Uzi fly tabs invented by CSR & TI, Mysore has also been advised to control Uzi fly. Nesolynx thymus was reared and used as biocontrol agent against Uzi fly.

RESULTS

Results recorded in table1 and figs 1 to 9 indicated that 16 states of India have been involved in mulberry or other sericultural practices. Out of which E. sorbillans was scattered in all major sericultural states namely, West Bengal, Karnataka, Andhra Pradesh, Tamil Nadu and Assam. The Uzi fly was also recorded from non sericultural states like Maharashtra, Madhya Pradesh and Jharkhand. In Maharashtra 26 districts were involved in mulberry sericulture, out of which Kolhapur, Sangli, Satara, Pune and Solapur districts showed higher mortalities in silkworms due to Uzi fly (fig.9). Rearing houses of districts Maharashtra touching to Andhra Pradesh and Karnataka were also Uzi infested. While, other districts showed relatively less infestation. In the states of south east, Uzi fly incidence was not noticed by sericultural farmers in their rearing houses. However, it was observed that Uzi fly was entered in nontraditional sericultural states like Madhya Pradesh, Jharkhand and Maharashtra. The economic status and distribution of E. sorbillans is recorded in table1 and fig 8 and 9. For rearing of silkworms many farmers used indigenous rearing houses (fig-2) which easily allowed Uzi fly to enter in house for parasitization of silk worms. In the rearing house, the Uzi fly laid macro type of whitish eggs one at a time on the silkworm body. Silkworm instars I, II, III, IV and V were parasitized by E. sorbillans. The instars III, IV and V when parasitized, the silkworms were killed before spinning of the coccons. But after Vth instar silkworm produced poor quality cocoon when parasitized by Uzi fly. The third instar larvae of Uzi fly came out by breaking the cocoon and thus cutting the intact silken thread into several pieces and making cocoons unfit for reeling. E. sorbillans completed its single generation within one month and about 8 to 12 generations were possible in a single year. In hot weather, development was fast and in cold it was slowed down. Overall, E. sorbillans altered economic status of sericultural practiceners and farmers. Therefore, preventive and curative control measures suggested below were found useful.

Preventive:

i) Collection and destruction of Uzi infested silkworms at beginning stages of infestation.
ii) Removal of alternative hosts. About 44 lepidopterous caterpillars are hosts of this fly.
iii) Uzi infected cocoons should not be used for seed purpose. During transportation such cocoons spread infes-

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tation.

iv) Close all ventilators of rearing house with the help of wire/ cotton mesh for preventing entry of Uzi fly in rearing house.
v) Construction of scientific rearing house.

Curative:

i) Use Uzi trap/tab invented by CSR & TI, Mysore.
ii) Release Nesolynx thymus parasitoids of E. sorbillans with at least 1000 per week in and around rearing houses or in cocoon market.

DISCUSSION

E. sorbillans was recorded from China, Japan, S. Korea, Thailand, Myanmar and Shri lanka and found attacking tasar, muga, mulberry and eri silkworms in India (Devaiah & Patil, 1994). According to Huchesh and Puttaraju (2014) E. sorbillans was reported from 22 different countries including Vietnam and Bangladesh. It is notorious pest of silk worm causing 30% crop loss. Uzi fly maggots were collected from 31 locations across Southern, Central, Northern and north eastern zones of India from various silk markets/ villages/ research institutes located in six different states of India namely, Karnataka, Andhra Pradesh, Tamil Nadu, Maharashtra, West Bengal and Assam. In India, Louis very first reported E. sorbillans on mulberry silk worms from west Bengal in 1880 estimating losses between £ 200, 00 to £ 300, 00 per annum. Since then Uzi fly constantly caused damage to silkworms in West Bengal. In south India this parasitoid was first reported on mulberry silkworm during May 1980 in Bulanarasapura village of Hosokote Tahasil of Bangalore district. Now it is well established in Karnataka. According to Rajshekhargouda and Devaiah (1983) Uzi fly was widely spread in Kolar, Tumkar, Mysore, Bangalore and Mandya districts of Karnataka.

According to Mukharjee (1919) E. sorbillans, a serious endoparasitoid of the mulberry silk worm B. mori was prevalent hitherto in Eastern and North Eastern regions of India (Datta and Mukharjee, 1978) was first introduced to Karnataka, the most prosperous sericultural tract of South India, during may,1980 (Anon,1981; Jolly, 1981). According to Mahadevappa (1992) E. sorbillans was introduced through Nisteri seed coccons brought from West Bengal by unscrupulous seed preparers. The very first survey made by Jolly (1981) indicated the spread of this fly to 170 villages, covering 400Km^2 and 4000 sericulturalist in the traditional sericultural area of Karnataka. The Uzi fly was spread in the entire Karnataka state by 1983(Siddappaji, 1985) and later shortly spread to other sericultural areas of Peninsular India (Channa Basavanna, 1992). In an initial survey of department of Sericulture, government of Karnataka (1981) the incidence of Uzi fly on silkworms was 64.68% since then a several studies conducted on E. sorbillans noted varying degrees of infestation by Uzi fly. However, Siddappaji and Channa Basavanna (1981) recorded 40 to 75% parasitism in silkworms by Uzi fly while, Kumar et. al. (1990) recorded 81.30% infestation on spinning worms and 68.30% on montages in the rearing of B. mori in Karnataka. According to Jolly (1987) the Uzi fly infestation was more than 40% in some of the heavily infested areas of Karnataka. While, in certain unprotected silkworm rearing, it ranged from 8.35 to 14.89% (Kumar et. al., 1987). Huchesh and Puttaraju (2014) collected E. sorbillans from silkworm rearings of Karnataka (South), Maharashtra (Central), West Bengal (North) and Assam (North East).

In West Bengal Uzi fly was recorded from Malda, Murshidabad, Birbhum and Behrampure districts. During November to April 20 to 90% infestation was noted on silk worms (Chakraborty et. al, 2007).Goswami et. al., (2014) studied the E. sorbillans infestation of Antheraea assamensis in Assam rearing houses. They reported that the Uzi fly was prevalent in five districts namely Lakshampur, Sonitpur, Kamrup, Udalguri and Kakrajhar. In Assam E. sorbillans infestation on A. assamensis larvae in the districts Lakhimpur, Sonitpur, Kamrup, Udalguri and Kokruzaron were 29.37%, 33.70%, 2.73%, 3.53% and 8.87% respectively.

Thangavelu and Sahu (1986) reported that the maggots of Uzi fly exhibited considerable variation in their body size and maggots developed within B. mori larvae were generally smaller in size than developed in A. assamensis larvae. According to Devaiah and Patil (1994) E. sorbillans copulated in air and survived on nectar of flowers and honey dew extracted by aphids, Delphacids, Jassids, Scales, etc. E. sorbillans completed its life cycle from egg to adult within 30 to 40 days and completed 8- 12 generations in a single year. All instars of mulberry silk worms were attacked by this parasitoid. Similarly, it parasitized tasar, muga and eri silk worms in different traditional and nontraditional sericultural states. Since E. sorbillans is limiting factor of economics of sericulture and can survive on its hosts in varied geographical and different agro climatic conditions in India, its control and dissemination prevention in virgin areas be made possible by adopting preventive and curative control measures suggested in the text.

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Table-1 Economic status of E. sorbillans **in different states in India**

Sr. no	State	Percent infestation of silkworms	Silkworm
1.	Karnataka	80.00%	B. mori
2.	Andhra Pradesh	40.50%	B. mori
3.	Tamil Nadu	30.00%	B. mori
4.	West Bengal	85.00%	B. mori
5.	Maharashtra	60.00%	B. mori
6.	Madhya Pradesh	10.50%	B. mori
7.	Assam	40.00%	A. assamensis
8.	Jharkhand	32.00%	A. myllita

Fig.1 Rearing house of silworm and mulberry garden

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Fig.2 Indigenous sikworm rearing house

Fig.3. Silkworm larvae in rearing house

Fig.4. Uzi fly infesting B. mori larvae

Fig.5 Silkworm cocoons (some infested by Uzi)

Fig.6 Cocoons of Uzi fly

Fig.7. Mulberry garden and farmers

Fig.8. Map of India showing sericultural and Uzi infesting states

Fig. 9. Map of Maharashtra showing sericultural and Uzi infested districts

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1. Ahemadanagar 2.Akola 3. Amaravati 4. Aurangabad 5. Beed 6. Bhandara 7. Buldhana 8. Chandrapur 9. Dhule 10. Gadchiroli 11. Jalgaon 12.Jalana 13. Kolhapur 14. Latur 15. Nagpur 16. Naded 17. Nashik 18. Osmanabad 19. Parabhani 20. Pune 21. Sangli 22. Satara 23. Sindhudurg 24. Solapur 25. Wardha 26. Yawatmal.

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