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Research Note

Effectiveness of some traditional and non-traditional protection measures on the recovery of uzi-infested eri silkworm

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ABSTRACT: **An attempt was made to study the effectiveness of some traditional and non-traditional protection measures on the recovery of eri silkworm parasitized by uzi fly, *Exorista sorbillans* (Wiedemann). Maximum recovery was obtained in bamboo-sieve (71.15%), followed by uzinet (60.51%), bleaching powder (2%) solution (35.41%) and neem leaf extract (33.83%), as against untreated control (14.79%). Physical barriers may be recommended for higher recovery of uzi-infested eri silkworms.**

KEY WORDS: Eri silkworm, *Exorista sorbillans*, recovery, uzi fly

Uzi fly *Exorista sorbillans* Wiedemann (Diptera: Tachiniidae) has been considered as one of the most serious parasitoids on non-mulberry silkworms (Chowdhury, 1970; Sarkar, 1980). The North-Eastern India, a traditional belt of Ericulture, experiences severe damage to eri silkworms due to parasitization by uzi fly. Thangavelu and Sahu (1986) recorded 31.42 - 39.70 per cent infestation of eri silkworm in this region. It has been reported to inflict over 40 per cent crop loss in some seasons in Eastern India (Anonymous, 1986). In Assam, this parasitoid has been reported to cause a maximum parasitization of 46.67 per cent in Jorhat district (Sarma and Khound, 2004). *Exorista sorbillans* has gained increasing importance in recent times as a parasitoid not only of eri silkworm, but also of non-sericigenous lepidopterans (Hu, C., 1983; Jamil *et al.*, 1993) and agricultural / forest pests (Wang *et al.*, 1999; Sarma *et al.*, 2006). It is possible to multiply *E. sorbillans* on eri silkworms in order to utilize the former as a bio-control agent of the important crop pests it parasitizes. However, eri silkworm being a beneficial sericigenous insect, we have to make a comparison between the profits in the production of eri cocoons and that of bioagent (*E. sorbillans*) on it. Moreover, the mass production of uzi fly on eri silkworms is not desirable from sericulture point of view. Here lies the importance of recovery of uzi-infested eri silkworm. Some of the uzi-infested silkworms form the cocoons normally, if the parasitisation occurs in late instars; thus, these cocoons are regarded as recovered cocoons. Such a situation would always be desirable where mass production of *E. sorbillans* and recovery of eri

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cocoons (to the extent possible) occur simultaneously. In this context, some of the traditional and non-traditional (new) control measures used against uzi fly were tested for the recovery (percentage and index) of uzi infested eri silkworms.

The study was carried out during 1997 - 1999 in Jorhat district of Assam under farmers' rearing condition. There were nine treatments including the untreated (unprotected) control which were replicated thrice in three experimental sites. Each treatment was replicated thrice in three rearing trays of 40cmx30cmx5cm size. Disease- free layings of white-plain local eco-race was collected from State Eri Grainage Centre, Dimow- to supply disease- free uniform seed materials to the rearers. For each replication, 25 late 2nd instar eri silkworms were selected randomly from a batch of uniform sized larvae for observation. Leaves of local non-powdery green variety were supplied to feed the worms.

A separate batch of about 250 eri larvae was reared in an insect cage protected from uzi fly to replace the dead larvae, if any, during the observation period. Trays under repellent treatments were kept in identical conditions but at a suitable isolation distance from that of other treatments. Two broods a year, *i.e.*, altogether six broods, were reared for observations during the period of higher natural incidence (March to September). A nylon net of 2.5x1.5m size was used to cover the trays with utmost care to avoid any entry point for uzi fly. Traditionally used medium size (diameter: 50cm) concave bamboo-sieve was used to cover the replicated trays. Mesh size and concaveness were the main criteria for selection of bamboo-sieve. The perforations of sieve were small (size: 9mm^2) to prevent the entry of uzi fly. Fresh leaves of mint (*Mentha* sp.), citran and neem (*Azadirachta indica*) were extracted by using mortar and pestle *in situ* and subsequently used for 48 hrs. Fresh mint leaves were crushed to extract the sap with known volume of water till a solution (leaf extract + water) of double the volume of water was achieved and thus, a stock solution of ratio of 1: 1 (50% concentration) was prepared. Required concentrations of treatments were prepared from the stock solution through Pearson's Square method (Srivastava, 1988). All the spray and repellent treatments were applied from 3rd instar onwards and spraying was done after each cleaning of the rearing trays in every morning except in the days of moulting of silkworms. However, for bleaching powder (2%) solution, the spray-schedule designed by Chakraborty *et al.* (1996) to avoid undue detrimental effect on silkworms. As per the schedule, spraying was done on six occasions on three different instars of eri silkworm, *viz.*, on 2nd day in 3rd instar; on 2nd & 4th day in 4th instar; and 2nd, 4th & 6th day in 5th instar. Presence of black scar on silkworm due to parasitisation by the uzi fly was the basis to consider them as infested. Recovery percentage and recovery index were calculated as follows:

$$\text{Recovery percentage} = \frac{\text{Number of uzi-infested silkworms forming cocoon}}{\text{Total number of uzi-infested silkworm}} \times 100$$

$$\text{Recovery index} = \frac{\text{Recovery percent under the test treatment}}{\text{Recovery percent under untreated control}}$$

The experiment was laid out in completely randomized design and the data were subjected to statistical analysis (Panse and Sukhatme, 1978).

In general, it has been noticed that the silkworms which got infested in late fourth instar or thereafter showed the ability to recover, whereas, the silkworms infested in early instars could not recover at all. Hence, any protection measure which prevented infestation at early instar could only have a good recovery.

Recovery percentage

Maximum recovery of 71.44 per cent was obtained from bamboo-sieve, followed by uzinet

Table 1. Recovery of uzi-infested eri larvae under traditional and non-traditional protection

Protection	Mean recovery in different broods (%)						Overall Mean	Recovery index
	Brood-1	Brood-2	Brood-3	Brood-4	Brood-5	Brood-6		
Uzi net	62.50 (52.24)	42.86 (40.86)	70.00 (56.79)	66.68 (54.77)	53.88 (47.22)	57.27 (49.18)	57.22	4.71
Bamboo-sieve	50.00 (45.00)	80.00 (63.44)	80.00 (63.44)	74.58 (58.76)	70.72 (57.24)	72.46 (58.36)	71.44	5.88
Bleaching powder (2%)	36.36 (37.11)	30.00 (33.21)	41.67 (40.22)	33.59 (35.50)	36.67 (37.27)	32.07 (34.49)	34.72	2.86
Citran (4%) as spray	25.00 (30.00)	26.32 (30.85)	17.39 (24.65)	20.98 (27.25)	20.59 (26.98)	24.43 (29.62)	22.48	1.85
Citran (4%) as repellent	24.00 (20.33)	16.67 (24.12)	15.63 (23.26)	12.22 (20.44)	17.13 (24.45)	12.38 (20.60)	15.55	1.28
Mint (4%) as spray	21.74 (27.76)	21.74 (27.76)	25.00 (30.00)	15.85 (23.46)	22.00 (27.91)	20.82 (27.14)	21.30	1.75
Mint (4%) as repellent	21.43 (27.56)	20.00 (26.56)	20.59 (26.99)	27.55 (29.03)	23.67 (29.10)	20.59 (26.28)	21.88	1.80
Neem leaf extract (5%)	30.76 (33.71)	33.33 (35.24)	33.33 (35.24)	37.92 (38.00)	35.32 (36.46)	30.11 (33.27)	33.09	2.72
Untreated control	22.22 (28.11)	15.38 (23.11)	14.29 (22.22)	7.25 (15.65)	12.00 (20.27)	9.67 (18.12)	12.15	1.00
Overall Mean	32.66	31.81	35.32	32.96	32.44	31.08		

	S.Ed.±	LDS (P = 0.05)
Protection (Recovery)	3.47	7.02
Brood (Recovery)	2.29	4.63
Recovery index =	0.44	0.89

Figures in parantheses are means of angular transformed values. Citran is a citronella bases commercial formulation

(57.22%) as against only 12.15 per cent in unprotected control. Both the physical barriers could prevent the early infestation to a great extent by maintaining a good isolation distance between its outer surface and the silkworms under it. Maintenance of such a "safe gap" between the physical barrier (bamboo-sieve & uzinet) and silkworms under it consistently for longer period may result in better recovery. It was observed that 4th and 5th instar larvae were heavily attacked by uzifly because of their high mobility within the treatment area. More infestation at highly mobile early 4th instar might be attributed to non-achievement of 100 per cent recovery under the physical barriers. Bleaching powder (2%) solution as topical sprays ranked 3rd with a recovery of 34.72 per cent followed by neem leaf extract (33.09%). Recovery was poor in repellent treatments. Mint and citran when used as repellent registered a recovery of 21.88 per cent and 15.55 per cent, respectively. Mean recovery under different protection measures in different broods were on par.

Recovery index

Recovery index was maximum in bamboo-sieve (5.88), followed by uzinet (4.71) as against 1.00 in untreated control. Other than the two physical barriers, bleaching powder (2%) solution and neem leaf extract (5%) used as topical spray registered more than twice (2.86 and 2.72, respectively) the recovery under untreated control. All other treatments were on par with the control.

From the overall observations, it can be concluded that recovery of uzi-infested eri silkworm was better under physical barriers (uzi net and bamboo-sieve), followed by bleaching powder (2%) solution used as topical spray. Botanicals (neem and mint leaf extract) used as repellents had no significant effect on recovery; however a higher recovery may be expected from spraying of the botanicals at high concentrations.

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