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# EFFECTIVENESS OF ECO-FRIENDLY MANAGEMENT PRACTICES AGAINST UZIFLY (*EXORISTA BOMBYCIS* L.) IN SILKWORM REARING UNDER FARMER CONDITIONS IN KOLAR DISTRICT, KARNATAKA INDIA

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**ABSTRACT**

The uzi-fly (*Exorista bombycis* L.) is a major endo-parasitoid of the mulberry silkworm (*Bombyx mori* L.), causing substantial cocoon yield losses in sericulture. This study assessed the effectiveness and economic viability of eco-friendly management practices physical exclusion, mechanical/chemical trapping, and integrated approaches over two consecutive years (2019–20 and 2020–21) in the selected villages of Kolar district of Karnataka. Infestation levels, cocoon damage, yield performance, and cost–benefit outcomes were systematically monitored. Integrated interventions combining nylon-net screening with trapping methods (yellow sticky and pheromone traps) significantly reduced uzi-fly incidence and cocoon damage while enhancing cocoon productivity. Among the treatments, nylon-net screening plus sex pheromone traps (T4) recorded the lowest infestation (0.72%), lowest defective cocoon percentage (0.23%), and highest cocoon yield (92.45 kg/100 DFLs). Economic analysis revealed that T4 also provided the maximum net return (Rs. 25,920/ha) and the highest benefit–cost ratio (3.34). The findings underscore the potential of integrated, eco-friendly management practices for effective uzi-fly suppression and sustainable sericulture in endemic regions.

***Keywords*** **:** Silkworm, Uzifly, Pheromone trap, Yellow Sticky trap, Nylon net, Economics, B: C Ratio.

## Introduction

The mulberry silkworm, *Bombyx mori* L., is most susceptible to pest and disease, since it is domesticated from past long generation and its productivity is frequently constrained by insect pests and diseases, of which the uzi fly, *Exorista bombycis* (Louis), is one of the most devastating parasitoids. The uzi fly lays eggs on late instar silkworms, and the emerging maggots penetrate and feed inside the host, ultimately causing mortality and leading to considerable cocoon yield losses (Nataraju *et al*., 2005; Chakraborti *et al*., 2012). Infestation levels vary depending on rearing practices and season but can result in up to 30–40% cocoon loss if unmanaged (Narayanaswamy *et al*., 2005). In Southern Karnataka, Kolar district is one of the India's major sericultural zones, yet reports indicate persistent Uzi-fly problems affecting farmer profitability. Management of *E. bombycis* has been a subject of extensive research due to its economic significance. Conventional methods include mechanical barriers such as nylon netting on doors and windows, which prevent adult flies from entering rearing houses (Siddiqui *et al*., 2000). In addition, several trapping methods have been developed to suppress fly populations, such as uzi traps baited with attractants, yellow sticky traps, and sex pheromone traps (Nataraju *et al*., 2005; Singh *et al*., 2014). Among these, sex pheromone-based management has emerged as an eco-friendly and highly efficient approach for monitoring and controlling adult populations (Reddy & Remadevi, 2004). Despite these advancements, comparative studies on the efficacy of different integrated management practices in field-level silkworm rearing are limited. Evaluating these strategies under practical conditions is essential to identify the most cost-effective and sustainable options for sericulturists. The

present investigation was undertaken to assess and compare the effectiveness of nylon netting, uzi traps, sticky traps, and sex pheromone traps in managing uzi fly infestation and improving cocoon yield in bivoltine silkworm rearing.

## Materials and Methods

The present study was conducted at farmers' fields in Kadudevandahalli and Muthanuru villages of Srinivasapura and Bangarpet taluks, Kolar District, during the rainy and winter seasons of 2019–20 and 2020–21 to evaluate the effectiveness of eco-friendly management practices against uzifly (*Exorista bombycis*) infestation in silkworm rearing. The experiment was laid out in a Completely Randomized Design (CRD) with four treatments and five replications. The treatments evaluated were: T1 – fixing nylon nets near the door and windows of the rearing house (control); T2 – T1 + installation of six uzi traps (tablets) near windows; T3 – T1 + installation of six yellow sticky traps near windows; and T4 – T1 + installation of six sex pheromone traps near windows. Rearing houses of 20 × 50 ft (1000 sq ft) capacity were used for silkworm rearing 200 DFLs of the FC1 × FC2 bivoltine hybrid, and each house was partitioned into four sections using nylon nets to prevent the movement of uziflies between treatments. From the total 200 DFLs, 50 DFLs were allotted to each treatment, corresponding to approximately 25,000 larvae. The number of uziflies trapped was recorded daily. Silkworm infestation percentage, uzifly-pierced cocoons, and defective cocoons were assessed at harvest. Cocoon yield per 100 DFLs was recorded. Cost economics were computed based on the input cost of each treatment, gross returns from cocoon yield, net returns, and benefit–cost (B:C) ratio. Data were collected using pre-structured observation records, statistically analyzed, and treatment means were compared at a 5% level of significance.

## Results and Discussions

Significant differences were observed among the four uzi-fly management practices evaluated under farmers' field conditions (Table 1). Sex pheromone trapping (T4) recorded the highest adult capture (146 flies), followed by yellow sticky traps in T3 (51 flies) and uzi traps in T2 (29 flies), while nylon-net treatment alone (T1) trapped no flies. Correspondingly, silkworm infestation was lowest in T4 (0.72%), which was significantly superior to all other treatments. Moderate reduction was observed in T3 (2.15%) and T2 (3.54%), whereas T1 recorded the highest infestation (5.47%). Uzi-pierced cocoon percentage also followed a similar trend, with T4 showing the minimum piercing (0.47%), followed by T3 (1.11%) and T2 (1.95%), while T1 recorded the maximum (2.90%). Defective cocoon production was lowest in T4 (0.23%) and highest in T1 (1.56%). Enhanced pest suppression resulted in a significant improvement in cocoon yield, with T4 achieving the highest yield (92.45 kg/100 DFLs), followed by T3 (87.62 kg), T2 (82.90 kg), and T1 (79.31 kg). The critical difference (CD 0.05 = 3.89) confirmed significant variation among treatments. These observations clearly demonstrate the superiority of pheromone trapping over other interventions for reducing uzi-fly activity and improving cocoon productivity. The superior performance of T4 corroborates earlier findings highlighting strong male-attractant responses of tachinid flies to species-specific pheromone blends (Bhattacharya & Ghosh, 2020). The significant suppression of infestation and piercing damage aligns with Ravi *et al.* (2023), who demonstrated the efficacy of pheromone traps in reducing *E. bombycis* oviposition on late-instar silkworms. The moderate efficacy of yellow sticky traps observed in T3 corresponds with the reports of Jaiswal *et al.* (2019), who recognized sticky traps as effective tools for monitoring tachinid populations. Nylon-netting alone (T1) offered partial protection but was insufficient to prevent fly entry, consistent with observations by Narasimha *et al.* (2021). The integration of physical barriers with mechanical/pheromone traps improved pest suppression, as also noted by Kumar *et al.* (2022). Higher cocoon yield and reduced defects in T4 can be attributed to minimized parasitism and larval mortality.

Economic analysis further supported the biological efficacy of improved interventions (Fig 1). T4 recorded the highest net return (Rs. 25,920/ha) and B:C ratio (3.34), primarily due to increased cocoon yield and lower crop loss. T3 and T2 recorded B:C ratios of 3.18 and 3.05, respectively, while the lowest ratio was observed in T1 (2.83). These results affirm that pheromone-assisted management is both technically effective and economically profitable under farmer field conditions. The economic advantage of pheromone-based management observed in this study aligns with findings by Kumar *et al.* (2022) and Prakash *et al.* (2022), who emphasized its cost-effectiveness for sericulture farmers.

Overall, the study validates sex pheromone trapping combined with nylon-net screening as an effective, eco-friendly, and economically sustainable strategy for managing *Exorista bombycis* in endemic sericulture regions. This integrated approach offers strong potential for large-scale adoption across southern Indian sericulture clusters.

**Table 1 :** Assessment on management practices of uzifly in silkworm rearing (Avg of Two consecutive Year data 2019-20 & 2020-21)

| Sl. No. | Treatment details | Uzifly trapped (No.) | Silkworm infested by Uzifly (%) | Uzifly pierced cocoon percent (%) | Defective cocoon (%) | Cocoon yield (Kg/ 100 dfls) |
|---|---|---|---|---|---|---|
| $T_1$ | Fixing Nylon net on near door and windows of rearing house | 0 | 5.47 | 2.90 | 1.56 | 79.31 |
| $T_2$ | Fixing Nylon net on near door and windows of rearing house + Uzi trap (6 Nos) near windows | 29 | 3.54 | 1.95 | 1.04 | 82.90 |
| $T_3$ | Fixing Nylon net on near door and windows of rearing house + Yellow sticky traps (6 Nos) near windows | 51 | 2.15 | 1.11 | 0.65 | 87.62 |
| $T_4$ | Fixing Nylon net on near door and windows of rearing house + Sex pheromone trap (6 Nos) near windows | 146 | 0.72 | 0.47 | 0.23 | 92.45 |
| S.Em ± | | 10.51 | 0.39 | 0.18 | 0.46 | 1.27 |
| CD (0.05) | | 31.67 | 1.23 | 0.57 | 1.41 | 3.89 |

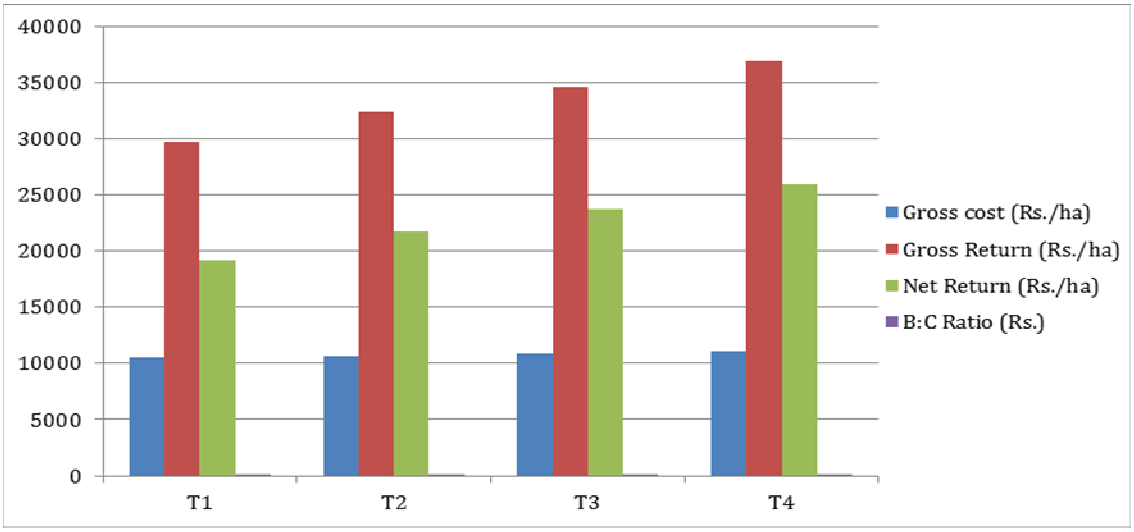


**Fig. 1 :** Cost economics of management practices of uzifly in silkworm rearing

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