

Constraints Perceived by the Silkworm Rearers in Management of the Uzi Fly, *Exorista bombycis* [Louis] in Mandya District of Karnataka, India

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Received: 07 Mar 2024; Revised accepted: 25 Apr 2024

Abstract

An investigation was carried out to know the constraints perceived by the silkworm rearers in management of the uzi fly in Mandya district of Karnataka, India using pre-structured interview schedule. Uzi fly is the major pest on silkworm which is enforced to damage cocoon production considerably. Silkworm rearers in management of the uzi fly are grouped into three categories (small, medium and big) based on their size of mulberry land holding. Constraints perceived by the silkworm rearers have been classified into four groups namely, general constraints, constraints in the use of physical method, constraints in the use of chemical method and constraints in the use of biological method. In respect of total farmers, large group of silkworm rearers expressed that financial problem in management of the uzi fly was a prime constraint (79.50%) and next in the order were incidence of uzi fly (72.00%), lack of awareness about uzi fly control measures (68.50%) and lack of knowledge about the incidence of uzi fly (66.50%). In physical method, cent per cent of the silkworm rearers opined that no support from government for purchase of nylon net was a major constraint followed by expensive in purchase of nylon net (96.00%) and lack of knowledge (65.00%). In chemical method, equal number of silkworm rearers (86.00%) expressed inputs are costly and non-demonstration of method, whereas 82.50% of silkworm rearers opined chemical method was not effective and non-availability of inputs. However, in biological method, large group of rearers opined that no awareness on the use of biological method was a major constraint (82.50%), followed by non-availability of biological agents (79.50%) and biological agents are not required (79.00%).

Key words: Biological method, Chemical method, Constraints, *Exorista bombycis*, Management, Physical method

Sericulture occupies unique place as it is both income and employment generating agro-based industry providing livelihood to about 9.2 million people in India. Sericulture mainly comprises both *on-farm* and *off-farm* activities and provides immense employment potential for both men and women. Sericulture is a well-established, commercially sustainable, farm based, economic enterprise favoring rural poor in the unorganized sector and also empowerment of rural folk, due to its relatively low investment of fixed capital with high returns. Though India ranks second in silk production next only to Peoples Republic of China, the average cocoon yield in India is considered to be very low, primarily due to crop loss on account of high incidence of pests and diseases on mulberry and silkworm throughout the year. However, the incidence of these pests and diseases differ significantly among different seasons. The annual crop loss due to pests and diseases were estimated to be around 30-40% (2003) and a crop loss of around 11.5 – 15.0 kg/100 DFLs at the point prevalence level [1]. Among the several factors that affect silkworm seed and commercial cocoon production, silkworm diseases and pests (insect and non-insect) form an important component. The mulberry silkworm, *Bombyx mori* L. is attacked by insects such as tachinid parasitoids, dermestid beetles, ants, earwigs, etc. [2].

The pests and parasites other than insects are mites, nematodes, wall lizards, rats, squirrels and birds that are also known to inflict considerable damage to silkworm and its crops [3].

Several insect and storage pests cause infestation and reduces the production and productivity of cocoons namely uzi fly, earwig, dermestid beetle, praying mantis, reduviid bug, stink bug, wasps and red ants. Among these, uzi fly is an endo-parasitoid that causes 15 to 20% yield loss. The extensive damage to silkworm crop due to uzi menace in sericulture created alarming circumstances and distressed the very root of sericulture in India. Due to its wide spread adoptability and availability of hosts it infests different types of silkworms [4]. The extensive damage to silkworm crop due to uzi menace in sericulture created alarming circumstances and distressed the sericulture in India. Due to its wide spread adoptability and availability of hosts it infests different types of silkworms. Though, sericulture has an advantage but there is a knowledge gap on adoption for obtaining good yield of cocoon production. It might be due to certain unforeseen changes that observed during rearing of silkworm. Some of the constraints which are experienced by the silkworm rearers in lower adoption of silkworm rearing technologies which ultimately results in getting the lower yield of cocoon production.

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Citation: Rahamathulla G, Sannappa B. 2024. Constraints perceived by the silkworm rearers in management of the uzi fly, *Exorista bombycis* [Louis] in Mandya district of Karnataka, India. *Res. Jr. Agril. Sci.* 15(3): 691-695.

Farmer's participatory approaches are fast gaining acceptance as an effective method to promote and establish more ecological approaches to crop production, which include IPM systems also. Farmer participatory training approaches aim at building farmers' capacity to identify their problems in production/productivity, make their own crop management decisions, based on a better understanding of the agro-ecology of their own 11 fields, according to their own unique set of circumstances and priorities. Through such skills, farmers become attractive and active research partners in field-based farmer participatory research projects. Therefore, Integrated Pest Management (IPM) techniques comprising physical, chemical and biological measures have been evolved and popularized for the control of silkworm pests. In sericulture enterprises, loss caused by the biotic and abiotic factors was evident due to exposure to various adversaries. As uzi fly infestation threaten silkworm crop production and productivity, silkworm rearers take suitable measures in combating the menace. However, the constraints too persist due to improper silkworm rearing houses, use of susceptible strains/breeds, favorable seasons, non-adoption of recommended management practices, etc. In this context, current investigation has been conducted in Mandya District of Karnataka State, India to investigate the constraints perceived by the silkworm rearers in management of the uzi fly.

MATERIALS AND METHODS

The current investigation has been conducted in Mandya District of Karnataka State, India. Mandya covers an area of 4962 square kilometres, predominantly agrarian, it lies between 76° 19' and 77° 20'E longitude and 12° 13' and 13° 04' N latitude, with an altitude ranging from 2500 to 3000 ft. above Mean Sea Level [MSL]. The Mandya district was purposely selected for the study. Altogether, sericulture has been practiced in 1092 villages with a mulberry area of 15,982 ha and as many as 30,869 families are practicing sericulture. The study was conducted in seven taluks of Mandya district of Karnataka state, India encompassing a total of 200 farmers. The number of silkworm rearers interviewed for data collection in each taluk depends on the mulberry area and the number of farmers engaged in sericulture. This research endeavor was formulated based on preliminary field surveys and in consultation with the Technical Staff of the State Department of Sericulture across various taluks in the Mandya district.

Silkworm rearers were categorized into three groups based on their size of mulberry holding namely small (< 0.50), medium (0.51 to 1.99) and big (>2.00) land holdings. The information on the current investigation was collected through formal discussion using pre-structured interview schedule. The silkworm rearers were asked about the constraints faced in management of the uzi fly. The response given by silkworm rearers have been classified into four groups namely I. General constraints, II. Constraints in the use of physical method, III. Constraints in the use of chemical method and IV. Constraints in the use of biological method.

Constraints in management of uzi fly at silkworm rearers condition

A. General constraints

- i. Lack of knowledge about the incidence of uzi fly
- ii. No incidence of uzi fly
- iii. Lack of awareness about uzi fly control measures
- iv. Financial problem

B. Constraints in the use of physical method

- i. Lack of knowledge
- ii. Expensive
- iii. No support from government for purchase of nylon net

C. Constraints in the use of chemical method

- i. Lack of knowledge
- ii. Not effective
- iii. Injurious to silkworm
- iv. Non - availability of inputs
- v. Inputs are costly
- vi. Non-demonstration of method

D. Constraints in the use of biological method

- i. No awareness
- ii. Not effective
- iii. Non-availability of biological agents
- iv. Biological agents are costly
- v. Not aware to use it independently
- vi. Not required

The analysis of data was carried out adopting the statistical tools like frequencies, percentages and mean. The data was analyzed using SPSS package (ver. 21.0).

RESULTS AND DISCUSSION

Constraints faced by the silkworm rearers in management of the uzi fly

In any crop or animal production systems/practices, constraints or problems or limitations exist as the crops or animals are exposed to vagaries of natural and man-made problems that reduce the crop/animal yields. In sericulture too, cocoon production is hindered by pests and diseases, thereby reduces the cocoon yields. Hence, they need to be identified and suitable strategies to be made to mitigate them at appropriate stage. In the current study, constraints faced by the silkworm rearers in management of the uzi fly among three categories of farmers (small. Medium and big) based on their size of mulberry land holding. The constraints in the present study are broadly grouped into general constraints, constraints in the physical, chemical and biological method for management of the uzi fly.

General constraints

Considerable variations were noticed among the different categories of farmers with respect to general constraints faced by the silkworm rearers in management of the uzi fly. In respect of total farmers, large group of silkworm rearers expressed that financial problem in management of the uzi fly was a prime constraint (79.50%). The other constraints next in the order were incidence of uzi fly (72.00%), lack of awareness about uzi fly control measures (68.50%) and lack of knowledge about the incidence of uzi fly (66.50%).

Constraints in the use of physical method

Three categories of farmers opined differences in expression of constraints in physical method of management of the uzi fly. Cent per cent of the silkworm rearers opined that no support from government for purchase of nylon net was a prime constraint in management of the uzi fly and the other constraints next in the rank were expensive (96.00%) and lack of knowledge (65.00%) in the use of physical method of management of the uzi fly.

Constraints in the use of chemical method

In this method too, different categories of farmers opined variations with respect to constraints in the adoption of chemical method of management of the uzi fly. In respect of total category of farmers, equal number of silkworm rearers (86.00%) expressed inputs are costly and non-demonstration of

method, whereas 82.50% of silkworm rearers opined chemical method was not effective and non-availability of inputs. On the other hand, the constraints that were found next in the order were chemical method was injurious to silkworms (78.50%) and lack of knowledge about the use of chemical method (76.00%).

Table 1 Constraints faced by the silkworm rearers in management of the uzi fly

Constraints	Categories of farmers						Total	
	Small		Medium		Big			
	(n=52)	%	(n=94)	%	(n=52)	%	(n=200)	%
I. General constraints								
Lack of knowledge about the incidence of uzi fly	34	65.38	76	80.85	23	42.59	133	66.50
Incidence of uzi fly	42	80.77	80	85.11	22	40.74	144	72.00
Lack of awareness about uzi fly control measures	10	19.23	80	85.11	47	87.04	137	68.50
Financial problem	45	86.54	82	87.23	32	59.26	159	79.50
II. Constraints in the use of physical method								
Lack of knowledge	38	73.08	79	84.04	15	27.77	132	65.00
Expensive	52	100.0	94	100.0	40	74.07	192	96.00
No support from government for purchase of nylon net	52	100.0	94	100.0	54	100.0	200	100.0
III. Constraints in the use of chemical method								
Lack of knowledge	34	65.38	79	84.04	39	72.22	152	76.00
Not effective	42	80.77	81	86.17	42	77.78	165	82.50
Injurious to silkworm	38	73.08	79	84.04	40	74.07	157	78.50
Non-availability of inputs	49	94.23	78	82.98	38	70.38	165	82.50
Inputs are costly	50	96.15	80	85.11	42	77.78	172	86.00
Non-demonstration of method	48	92.31	78	82.98	46	85.18	172	86.00
IV. Constraints in the use of biological method								
No awareness	48	92.31	79	84.04	38	70.37	165	82.50
Not effective	43	82.69	70	74.47	17	31.48	130	65.00
Non-availability of biological agents	46	88.46	83	88.30	30	55.56	159	79.50
Biological agents are costly	39	75.00	65	69.15	15	27.78	119	59.50
Not aware to use it independently	42	80.77	65	69.15	38	70.37	145	72.50
Not required	50	96.15	86	91.49	22	40.74	158	79.00

Constraints in the use of biological method

Notable variations were observed with respect to opinion of the silkworm rearers on constraints in the use of biological method for the management of uzi fly among the three categories of farmers. In the total category of farmers, large group of silkworm rearers opined that no awareness in the use of biological method was a major constraint (82.50%), followed by non-availability of biological agents (79.50%), biological

agents not-required (79.00%), not aware to use it independently (72.50%), not effective (65.00%) and biological agents are costly (59.50%). These insights suggest a range of challenges and perceptions surrounding the adoption of biological methods for uzi fly management among silkworm rearers in the studied population. Addressing these constraints could be crucial in promoting the uptake of more sustainable and environmentally friendly pest management practices in sericulture.

Table 2 Support required for silkworm rearers from Government for effective management of the uzi fly

Support required [Opinion]	Categories of farmers						Average	
	Small (n=52)		Medium (n=94)		Big (n=54)			
	Garrett score	Rank	Garrett score	Rank	Garrett score	Rank	Garrett score	Rank
Construction of separate rearing house	51.69	3	61.44	1	60.46	1	57.86	1
Subsidy	55.60	1	52.83	2	51.02	3	53.15	2
Demonstration/training	53.88	2	52.10	3	53.39	2	53.12	3
Purchase of nylon net	50.90	4	40.62	5	43.91	5	45.14	5
Purchase of chemicals	45.08	5	51.22	4	47.67	4	47.99	4
Purchase of bio-control agents	42.85	6	40.46	6	43.81	6	42.37	6

Support required for silkworm rearers from government

In respect of support required for silkworm rearers from Government towards the management of uzi fly, more number of silkworm rearers opined that support required for construction of separate rearing house was found to be of major importance as it ranked first (57.86) and next in the rank were subsidy required for management of the uzi fly (53.15), demonstration/training (53.12), purchase of chemicals (47.99), purchase of nylon net (45.14) and purchase of bio control agents (42.37). According to Khan [5], incidence of uzi fly was the major constraint (64%) among silkworm rearers. While Ramakrishna [6] stated that the uzi fly incidence was the major problem in cocoon production and 97% of the silkworm rearers expressed their inability to have separate rearing house. Sreenivasa [7] reported that the constraints in adopting the recommended practices by the sericulture farmers are uzi fly infestation (85%), lack of availability of silkworm protection measures (82%) and lack of separate rearing house, free from hazards of smoke, ants, hot air, etc. (80%). As per Kerutagi [8], constraints faced by the silkworm rearers in Bijapur district of Karnataka are incidence of pests (uzi fly) and diseases, water scarcity during summer months and excess heat in summer. Further, it has been reported that uzi fly was managed using individual tray covers with nylon mesh, proper disinfection of all the materials used in the silk cocoon production, rearing of silkworm in huts and mud houses to control excess heat during summer. According to Jagannatha Rao [9], Inadequate market facilities (80%), lack of control measures for silkworm diseases and pests (74%), non-availability of DFLs (52%) and disinfection of chemicals in right time (48%) were considered as major constraints. While, Govindaiah *et al.* [10] reported that the major constraints in adoption of uzi control measures are lack of awareness and non-availability of inputs. Further, it was observed that knowledge about bio-control agents for pest control was very less. Whereas, Dandin *et al.* [11] observed that the gap in adoption were found less in the mechanical (18.0%) and chemical methods (10.7%) for the control of uzi fly attack in silkworm rearing but a wide gap of 90.2% was observed in case of bio-control method. According to Mallikarjuna *et al.* [12], lack of awareness (97%) was the major constraint for non-adoption of biological control for uzi fly management. As per Moulasab and Sudhakara [13], sericulture farmers in Koppal district faced lack of knowledge regarding control of pests and

diseases (84%) was the major constraint. Reddy *et al.* [14] reported that 50% of the respondent silkworm rearers have faced lack of knowledge on uzi control during silkworm rearing. With regard to silkworm rearing constraints Hadimani *et al.* [15] reported that Cent per cent of the farmers expressed lack of knowledge regarding control of pests and diseases like uzi fly, ants, pebrine, white muscardine and yellow muscardine in Bidar district of north Karnataka. According to Vishakanta and Venkateshappa [16], the silkworm rearers who belonged to age group of below 30 years (83.00%) faced more problem during silkworm rearing when compared to 31 to 41 (33.00%), 41 to 51 (31.00%) and above 50 (27.00%) year's age group. However, least problems were faced by the silkworm rearers who belonged to age group between 51 to 60 years' (21.00%). Further, silkworm rearers who had graduate level of education had more problems (60.00%) when compared to the silkworm rearers who had PUC level of education (16%). According to Kumar *et al.* [17], lack of knowledge about integrated management of pests in mulberry and cocoon production was a major constraint faced by the silkworm rearers in K. R. Pet taluk of Mandya district. As per Hosamani *et al.* [18], among different indicators of economic efficiency in sericulture, net returns have greater impact on the practical utility and acceptance of the production technology by the farmers. Hatibaruah *et al.* [19] reported that lack of regular technical guidance was the major constraints faced by the respondents (84.16%), followed by lack of knowledge about identification of pests and diseases (81.66%), frequent and high incidence of pests and diseases (65.00%) and non-availability of insecticide and fungicide on proper time (62.50%).

CONCLUSION

The investigation inferred that, silkworm rearers in the study area are facing constraints in management of the uzi fly and they need to be addressed by providing knowledge and support to reduce the infestation caused by the uzi fly to enhance the production and productivity of cocoon crop. Adopting effective pest management practices not only benefits individual farmers but also contributes to the overall resilience and sustainability of the sericulture industry. By minimizing the impact of uzi fly infestation, farmers can achieve higher yields, improved quality of cocoons and enhance livelihoods.

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