



Research paper

Challenges and Prospects of Bivoltine Silkworm Rearing with Special Reference to Jammu Division of Jammu and Kashmir, India

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ARTICLE INFO	ABSTRACT
<p><i>Article history</i></p> <p>Received 22 January 2022 Revised 16 April 2022 Accepted 23 April 2022 Published 17 May 2022</p> <hr/> <p><i>Keywords</i></p> <p>Bivoltine Mulberry Rearing Sericulture Silkworm</p>	<p>In Jammu division, sericulture was introduced over a century ago. Being a traditional cultivator of bivoltine silk of international standard but unfortunately the multi-fold potential of the region is characterized with insignificant cocoon production that cannot sustain the international market. The gap between the potential and actual yield obtained by the silkworm rearers are not fully exploited, as such, there is need to have new direction in planning of transfer of technology by designing more effective linkages between technology providers, extension workers and silkworm rearers. Hence, this survey was conducted with the ultimate objective of highlighting the pertinent challenges faced by the sericulturists in Jammu region and also sought to establish the present and future prospects available for sericulture development and prosperity. The information on many challenges faced by the silkworm rearers to meet the market demand was gathered from randomly sampled 225 respondents following personal interview schedule. Results revealed major factors responsible for expected and obtained yield gap as insufficient mulberry trees (69.78%), lack of season hybrids (58.67%), fluctuations in cocoon rates (46.67%), competition from other crops (44.0%) and insufficient training programs (25.33%) are the main constraints being faced by the silkworm rearers.</p>

1. Introduction

India is the only country to enjoy the pride of being the producer of all the four types of natural silk namely mulberry, tasar, eri and muga and the major sericultural states of the country are designated as the traditional sericulture states viz. Karnataka, And-

-hra Pradesh, West Bengal, Tamil Nadu and Jammu and Kashmir. Among these, three Southern states contribute more than 50 per cent of the total silk production by having 5-6 crops per year due to the availability of favourable agro-climatic conditions pr-



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-evailing there. The North-Indian states which are delimited into two distinct sericultural zones based on the agro climatic conditions viz. temperate and sub-tropical have only two crops per year and contributes a meagre percentage of cocoon production but have prime importance in international silk market because of the un-comparable quality appearance in terms of luster, shimmering appearance and various other important metric traits and as such the northern states have an excellent potential for increasing the raw silk production.

Jammu and Kashmir is well recognized for its varied climatic conditions and Jammu division of the region advocates variety of climatic conditions ranging from subtropical, intermediate to sub-temperate. Two commercial silkworm rearings being practiced in the potential areas in the month of February/March and in August/September termed as spring and autumn rearing respectively. The adverse climatic conditions during autumn are not conducive for rearing in some areas of some districts on account of high temperature coupled with high humidity and in some areas having high temperature and low humidity besides, poor leaf quality at field level. The average cocoon yield per oz. seed during 2016-17 spring rearing was 34 Kg and 21 kg during autumn season. During 2016-17 the total cocoon crop production in Jammu division was 578 MT i.e. around 60 per cent of total cocoon crop produced by the state (973 MT) with an average yield of 33 Kg/oz. generating an income of 11.86 crores for silkworm rearers of Jammu region (Dar et al., 2009).

In Jammu division, silkworm rearing is traditionally practiced by poor landless farmers of Kandi belt in their dwelling houses and accumulation of disease causing pathogens is a constant phenomenon. In spite of socio-economic benefits given to poor and landless sericulturists under different Centrally Sponsored Schemes, the marginal farmers still face number of problems which needs to be addressed for reducing the gap of obtainable cocoon yield at field level. The gap between the potential and actual yield obtained by the silkworm rearers are not fully exploited, as such, there is need to have new direction in planning of transfer of technology by designing more effective linkages between technology providers, extension workers and silkworm rearers. Hence, this survey was

conducted with the ultimate objective of highlighting the pertinent challenges faced by the sericulturists in Jammu and also sought to establish the present and future prospects available for sericulture development and prosperity.

2. Methodology

The survey sample comprised of randomly selected 225 respondents purposively from three major cocoon producing districts viz. Kathua, Udhampur and Rajouri having maximum number of silkworm rearers, registered with state sericulture development department in the year 2016-17. Information on various problems and prospects experienced by the respondents was gathered following personal interview. The data gathered was tabulated and inferences were drawn on the basis of percentages.

3. Results and Discussion

3.1 Problems Related to Mulberry Production

In Rajouri district, 89.33 per cent respondents reported lack of irrigation facilities as main problem followed by insufficient mulberry trees (88.00 %) and insufficient land for plantation (60.00 %). In district Udhampur, the main problem reported was lack of irrigation facilities (86.67 %) followed by insufficient mulberry tree (73.33 %) and insufficient farm yard manure (57.33 %). In district Kathua, lack of irrigation facilities (76.00 %) followed by insufficient mulberry trees (48.00 %) and insufficient land for plantation (46.67 %) were reported as main problems. The overall percentage indicated that mulberry disease incidence during autumn rearing (84 %) ranked first followed by lack of irrigation facility (82.67 %) and insufficient mulberry trees (69.78 %) were the main problems faced by the respondents in all the districts. (Table 1).

Table 1. Ranking of problems with respect to host plant

Parameter	Districts			Overall percentage	Rank
	Kathua (n=75)	Udhampur (n=75)	Rajouri (n=75)		
Disease Incidence in autumn	20.00	4.00	1.33	84.00	I
Lack of irrigation facility	76.00	86.67	89.33	82.67	II

Insufficient mulberry trees	48.00	73.33	88.00	69.78	III
Insufficient land for plantation	46.67	60.00	60.00	55.56	IV
Insufficient manure (FYM)	45.33	57.33	54.67	52.44	V
Coarse leaf during autumn	37.33	34.67	49.33	40.44	VI
High cost of fertilizers	32.00	42.67	32.00	35.56	VII
Pest infestation in autumn	13.33	01.33	04.00	06.22	VIII

3.2 Problems Faced by Respondents in Silkworm Rearing

The main problem faced by respondents in three districts was high disease incidence due to harsh climatic conditions during autumn season. In Rajouri district, 65.33 per cent respondents reported lack of season specific hybrids as the main problem followed by silkworm pest attack (54.67 %), lack of rearing appliances (52.00 %) and 45.33 per cent inadequate rearing place. In district Kathua, improper disinfection (49.33 %) in the dwelling house and pest attack was reported as main constraint followed by season specific hybrids (48.00 %), lack of rearing appliances (45.33 %) and 44.00 per cent inadequate rearing space. In district Udhampur, season specific hybrid (62.67 %) scored first problem followed by pest attack (44 %) and lack of appliances (38.67 %). The overall percentage of all the districts shows that lack of season specific hybrids (58.67 %) especially for autumn scored first followed by pest attack (49.33 %) and lack of rearing appliances (45.33 %) were the main problems faced by the respondents in adopting sericulture (Table 2).

Table 2. Ranking of problems with respect to silkworm rearing

Parameter	Districts			Overall percentage	Rank
	Kathua (n=75)	Udhampur (n=75)	Rajouri (n=75)		
Lack of season specific hybrids	48.00	62.67	65.33	58.67	I
Pest attack	49.33	44.00	54.67	49.33	II
Lack of rearing appliances	45.33	38.67	52.00	45.33	III
Improper disinfection in dwelling houses	49.33	33.33	44.00	42.22	IV
Inadequate rearing place	44.00	33.33	45.33	40.89	V

3.3 Problems Faced by Respondents in Marketing of Cocoons

The data on problems faced by respondents related to marketing of cocoons in study areas are presented in Table 3. In district Kathua, 58.67 per cent respondents perceived lack of proper transportation facility and in district Udhampur and Rajouri fluctuation in rates (50.67%) and (48.09 %) respectively was observed as main problem in marketing of cocoons. The overall results of three districts ranked first problem as fluctuations in cocoon rates (46.67 %) followed by inconvenience during transportation of cocoon (40.89 %) for re-auction on next day.

Table 3. Ranking of problems in marketing of cocoons

Parameter	Districts			Overall percentage	Rank
	Kathua (n=75)	Udhampur (n=75)	Rajouri (n=75)		
Fluctuations in cocoon rates	41.33	50.67	48.00	46.67	I
Inconvenience during transportation	58.67	48.00	16.00	40.89	II

3.4 Technical and General Problems

Major technical and general issues identified and ranked using percentage method. In district Kathua, major constraint observed were insufficient training programs (49.33 %) and competition from other crops (38.67 %). In district Udhampur, the major problem perceived were competition from other crops (40.00 %) and insufficient training programs (38.67%) whereas in district Rajouri, respondents reported competition from other crops (53.33 %) as major problem followed by lack of knowledge to use technological products (37.33 %). The overall percentage of all the three districts indicated that competition from other crops (44 %) ranked first followed by insufficient training programs (25.33 %) and lack of knowledge to use technological products (24.44 %) were main technical /general problems faced by them (Table 4).

Table 4. Ranking of technical and general problems

Parameter	Districts			Overall percentage	Rank
	Kathua (n=75)	Udhampur (n=75)	Rajouri (n=75)		
Competition from other crops	38.67	40.00	53.33	44.00	I
Insufficient training programs at their door steps	49.33	38.67	13.33	25.33	II
Lack of knowledge to use the technological products	09.33	26.67	37.33	24.44	III
Low awareness to manage harsh environmental conditions	26.67	24.00	09.33	20.00	IV

According to present survey, major problems being faced by the respondents for insignificant cocoon production were identified and predicted to be insufficient mulberry trees as 88.00 per cent in Rajouri, 73.33 per cent in Udhampur and 48.00 per cent in Kathua due to non-adoption of pruning schedule and other sericulture practices. Dhane and Dhane (2004), Dar et al. (2009) and Chouhan et al. (2016) also reported the unavailability of quality mulberry leaf with sufficient quantity as a major challenge faced by the farmers, responsible for excessive crop loss particularly in autumn rearing. Sharma et al. (2019b) reported about 45 per cent yield gap was due to ignorance in proper disinfection and failure in maintenance of micro-climate i.e. temperature and humidity which supports the findings of current study.

Current survey revealed that respondents are receiving same double hybrid i.e. FC1 X FC2 in both spring as well as autumn season. Due to lack of thermo-tolerant hybrids for autumn season, excessive crop loss (41.18 per cent) in autumn season was reported Sharma et al. (2019a). Due to inadequate space and appliances, also contributes great share in excessive crop loss due to attack of pests like ants, lizards etc. which supports the earlier finding of Jadhav and Karjule (2007) and Sharma et al. (2019b). Insufficient training programmes at respondents door steps leads to their unawareness to manage harsh environmental conditions especially during autumn and lack of knowledge about use of technological products, care during moult, post

cocoon practices etc. for A-grade cocoons as observed by Sujatha et al. (2006), Dyananda and Kamble (2008) and Pandey (2014). With respect to marketing of cocoons, respondents facing problems like fluctuations in cocoon price and inconvenience during transportation. Munikrishnappa et al. (2002), Sharma et al. (2019b) and Illahi et al. (2016) reported the similar results reflecting marketing system as a major drawback in the progress of sericulture industry.

4. Conclusion and Suggestions

Jammu and Kashmir have the potential to meet the demand of international standard bivoltine silk due to its conducive climatic conditions but the number of families engaged in sericulture in 1940 were 52000 which has come down to 23900 in 2017. Two successful crops can be harvested after adoption of sericulture practices if efforts for upliftment of sericulture industry have been made by the department in collaboration with central silk board and agriculture universities. It is therefore concluded on the basis of current survey that even though the number of beneficiaries and cocoon production is declining but the future is highly prospective as there is great demand of bivoltine silk outside the region and country as well thus following suggestions have been made, which if followed would help in enhancement of cocoon productivity.

- Mass plantation of high yielding mulberry plants in the vicinity of rearing zones
- Provision of quality leaf to landless rearers from government mulberry farms at minimum price will minimize the crop losses.
- Creation of mulberry reserves on government land in rearing zones will improve rearing capacity.
- Creation of co-operative chawki rearing centres at block level managed by the progressive rearers of the area.
- It is suggested to provide adequate rearing space to the farmers for chawki rearing where ideal environmental conditions, disinfection and hygiene could be maintained.
- On farm demonstration of latest technologies through village adoption.
- Expert teams should be made for monitoring field crops during rearing period so that on spot corrective measures are taken.

- Season specific hybrids should be provided to rearers since spring and autumn seasons have huge variation in environmental conditions.
- The progressive farmers should be encouraged to participate in dissemination of recommended sericultural technologies.
- Timely marketing facility needs to be ensured.
- Providing technical education regarding sericulture to all rearers at village level.

Training and Awareness programmes to be conducted on various aspect of sericulture on regular basis jointly by research, extension and development department.

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Declaration of Conflict

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