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Prospects of Sericulture in Border Areas of Jammu with Special Reference to Poonch District

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The most significant economic sector is sericulture, which has a variety of entrepreneurship opportunities and the ability to increase regular periodicity of economic returns. The effective rate of rearing and the techniques used during the rearing stage are the most crucial factors in a good cocoon harvest. Additionally, technical expertise and scientific knowledge are needed for silkworm cultivation. An effort has been done in the form of a survey research to learn more about the knowledge and skill profile of the sericulture farmers in the Poonch area. The study found that farmers lack technical expertise in commercial rearing and scientific knowledge. Low productivity in the district as compared to other districts of Jammu and Kashmir is caused by a lack of understanding about new technology. In this context, State Sericulture Development Department, Central Silk Board Sub-departments, and Post Graduate Department of Sericulture, Poonch Campus, University of Jammu, play important roles in the form of extension programmes for enhancing technical skills among the district's sericultural farmers. The study unequivocally shown that there were significant differences in the socioeconomic condition of sericulturists among the farmers in Tehsil Haveli, Poonch District, and that these differences also existed in knowledge and implementation of sericultural methods. Therefore, the extension staff must work together to convey better sericultural technology to the farmers in order to increase cocoon output.

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Keywords: Sericulture; productivity; technical skills; profitability; extension.

1. INTRODUCTION

Small and marginal farmers dominate Indian agriculture (78.20 percent), with an average landholding of less than 1.43 hectares, and producing only enough for subsistence [1]. As a result, it is crucial to diversify high-value commercial crops that provide poor and small farmers with resources and employment. Finding a suitable business that requires a minimal capital investment, guarantees a consistent income stream, and creates employment is necessary for the effective utilisation of family labour [2]. Indian planners and policymakers have put a lot of effort into finding practical ways to lower poverty and unemployment [3-5]. Additionally, the jobs that are created must be effective enough to guarantee the poor a minimum wage and a decent standard of living. Sericulture, with its enormous potential for creating jobs in rural regions, is crucial in this setting for lowering rural poverty and unemployment [6-11]. Given that it integrates both agriculture and industry, it is one of the agricultural enterprises that is recognised as the most appropriate labor-intensive family activity [12,13]. The practise of producing silk by raising silkworms on mulberries is known as sericulture. It is an agricultural cottage industry that can create a significant amount of profitable employment in rural locations with very little initial investment [14]. In India, sericulture has developed into a highly lucrative cash crop with minimal input and large returns. It is the only cash crop that offers regular, all-year-round attractive profits [15-21]. Numerous studies have also shown that sericulture provides farmers with year-round work and revenue [22].

Creating agro-based cottage structures in rural areas that fit into the socioeconomic sector as a useful tool for groups in society to use for low investment and large returns; this is why they are known as "Kalpavriksha" or "Kamadhenu" of the underprivileged [23]. The silk industry has a significant demand for numerous forward and backward linkages because it is by its very nature a cluster of numerous on- and off-farm operations. The sector requires support for information and technology, financing availability, timely raw material supply, market ties, the creation of skilled labour, etc. [24-31].

Technology is sometimes seen to be a product created by researchers that linearly descends to farmers [32,33]. According to studies, international research institutes frequently view farmers as the intended recipients of technological transfer. Scientists applaud individuals who adopt their theories and criticise non-adopters as conventional or conservative farmers who don't adopt modern farming practices [34-42]. The belief that whatever being brought must necessarily be better than local varieties and farming methods since it is more scientific and advanced [43-48]. Some technology's lack of adoption is attributed to farmers' unwillingness to recognise its advantages or to obstacles in the transfer process [49]. The knowledge and acceptance of sericultural technology in both traditional and non-traditional sericultural belts have been significantly influenced by the social and economic circumstances of the farmers.

2. METHODOLOGY

2.1 Sampling Design

The study was carried out in the seven villages of Degwar, Kasalian, Ajote, Gultur, Salotri, Jhulass, and Daradullian in the Tehsil Haveli of the Poonch District. Five farmers were chosen from each village, and information was gathered from them.

2.2 Source and Method of Data Collection

Through scheduled formal conversations, information about the farmers was gathered. A pre-tested schedule and a personal interview method were used to gather primary information on the beneficiaries from the sample respondents in the months of June and July 2020.

2.3 Method of Data Analysis

2.3.1 Measurement of independent variables

The operationalized independent variables in this study are:

Age: The study took into account a person's actual years of service at the time of the study. The respondents were asked to provide their age, which was recorded. The sample's responses were divided into three age groups: young, middle-aged, and old.

Education: The respondents' formal education was noted and measured when they indicated it.

Family Size: The total number of men, women, and children living in the respondent's family is indicated by this variable. According on family size, the respondents were divided into three groups: big, medium and tiny.

Total Land Holding: The size of the respondents' irrigated land holdings is indicated by this variable. Three groups: big, medium and small land holdings were used to categorise the respondents.

Social Participation: The type of membership and length of membership were used as the two criteria for evaluating a person's involvement in formal organisations. Using frequencies, the respondents were divided into groups based on the type of membership (either member or office bearer) and length of membership (measured in years).

Cocoon Yield (kg/100 DFLs): The number of DFLs raised during the previous year was recorded, and the data was then translated to cocoon yield in kg/100 DFLs. This variable relates to the cocoon yield attained by the respondents. Following that, the responders were divided into groups with high, medium, and poor yields.

2.3.2 Measurement of dependent variables

Knowledge Level: The interviewees were questioned regarding their familiarity with sericultural technologies. According to their level of knowledge—complete knowledge, partial knowledge, and no knowledge—sericulturists' responses were divided into three categories: full, partial, and no knowledge. Full, half and nil categories each received a certain proportion.

Adoption Level: The same sericultural technologies that were used to gauge adoption level were also utilised to gauge knowledge level. The respondents' responses about the adoption of technology were recorded, same like when testing their knowledge level. The categories received percentages of full, partial, and zero, respectively.

2.4 Statistical Analysis of Data

The statistical techniques including frequencies, percentages and mean were applied during the data analysis.

3. RESULTS AND DISCUSSION

3.1 Socio-Economic Status of Sericulturists

Table 1 contains information on the socio-economic standing of Sericulturists among the study's farmers.

3.2 Age

Age is a highly significant characteristic that has a significant impact on a person's social and personal life. The farmers in this study range in age from youth to old age (Fig. 1). In the survey, it was found that 24 farmers (68 percent) were older than 65, while 9 (25 percent) were in the middle of their lives, and 2 (5 percent) were younger (Table 1).

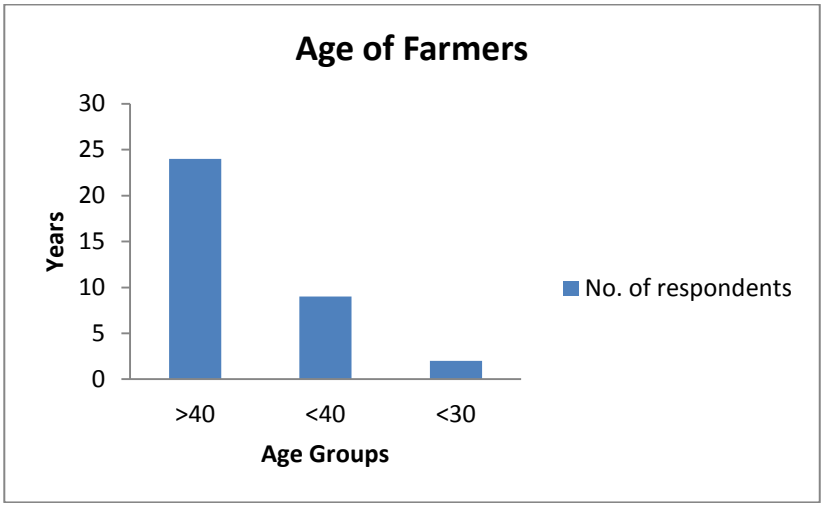

Fig. 1. Age of farmers

3.3 Education

According to the current study, out of 35 farmers, 9 (or 25 percent) are illiterate, 25 (or 71 percent) are in the fifth through tenth grade, and 1 (or 2 percent) are in the secondary grades (Fig. 2).

3.4 Family Size

According to the study, four respondents (11%) had medium-sized families (7-9 individuals), compared to the bulk of 31 farmers (88%) who had tiny families (7) (Fig. 3).

3.5 Land Holding

In the research area, different farmers had different amounts of land: 2 farmers (5%) had large land holdings (>4 acres), 5 farmers (14%) had medium land holdings (2-4 acres), and the remaining 28 farmers (80%) had small land holdings (2 acres) (Fig. 4).

3.6 Primary Occupation

According to the survey, 34 farmers (97%) have agriculture and sericulture as their primary line of work, while just one farmer (2%) is involved in any other businesses. This makes agriculture and sericulture the primary occupation among the 35 respondents (Fig. 5).

3.7 Social Participation

All of the farmers participated in self-help groups, however none of the 35 farmers had membership in any organisations or served as an office bearer.

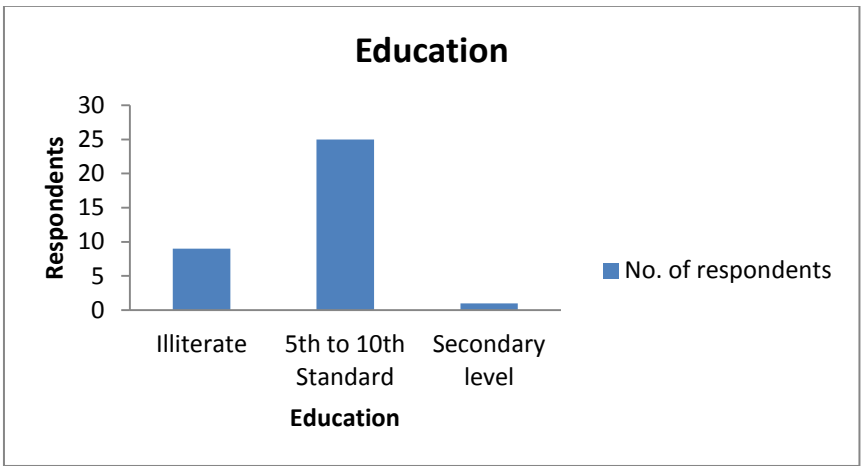

Fig. 2. Education

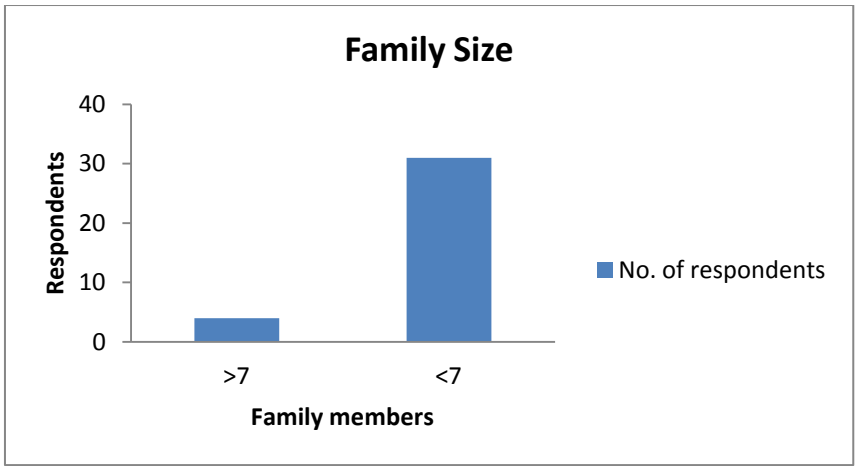

Fig. 3. Family size

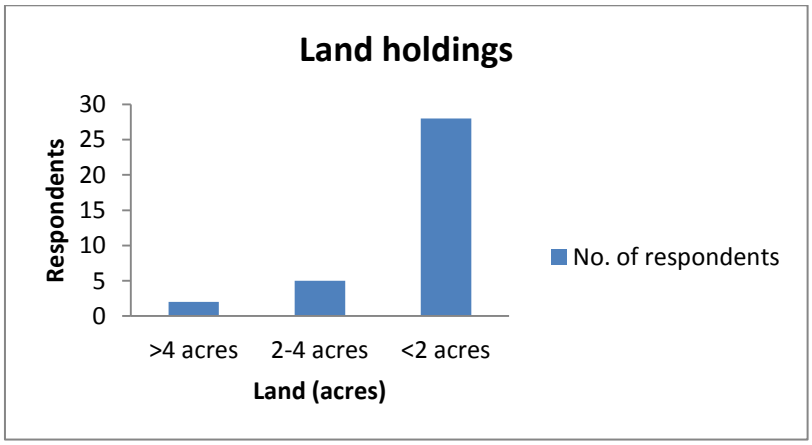

Fig. 4. Land holdings

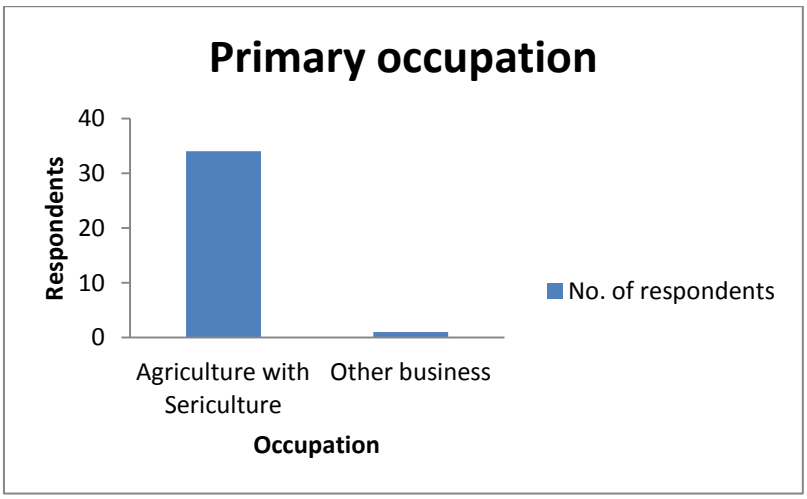

Fig. 5. Primary occupation

3.8 Experience in Sericulture

The average amount of experience among the 35 respondents was 12 farmers (34%) with medium experience (15–20 years), 3 farmers (8%) with greater experience (10–15 years), 10 farmers (28%) with more experience (5–10 years), and 10 farmers (28%) with less experience (5 years) (Fig. 6).

3.9 Mulberry and Silkworm Rearing Practices

The data on the adoption of mulberry and silkworm rearing practices by the farmers of Tehsil Haveli, Poonch District are presented in Table 3.

3.10 Mulberry Production Practices

Among 35 farmers, 3 farmers (8%) are having medium land source (0.25 acres) and rest of the 33 farmers (94%) are having less land sources (<0.25 acres).

Among 35 farmers, all are propagating Chakmajra mulberry variety and all are maintaining the 3'x 3' plant spacing. About irrigation, none farmers are having bore-well irrigation source nor adopted canal irrigation source. All the 35 farmers (100%) adopted rainfed method of irrigation.

3.11 Silkworm Rearing Practices

Floor –None of the farmers adopted floor rearing.

Wall – All the farmers constructed the rearing houses with the help of mud and stone.

Roof -Majority of the farmers i.e., 23 farmers (65%) thatched roof and rest of the 12 farmers (34%) having tin roofed rearing house.

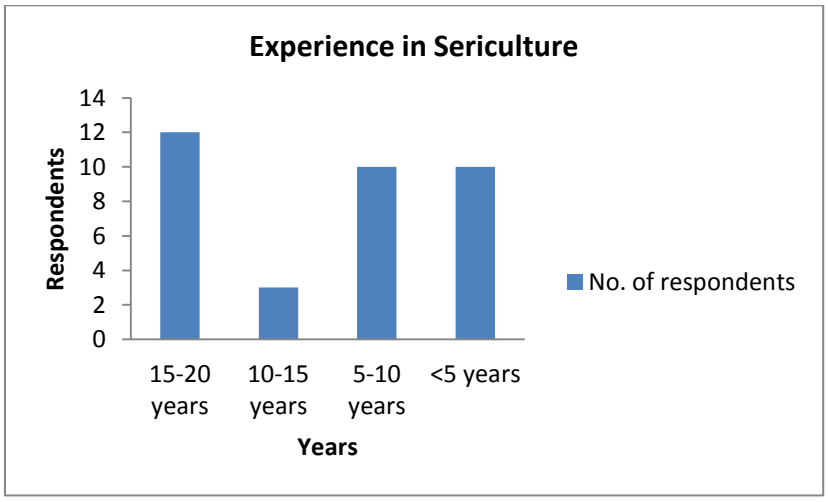

Fig. 6. Experience in sericulture

Entrance - Among 35 farmers, all farmers (100%) having common entrance.

Disinfection - All the 35 farmers (100%) carried out disinfection by common method with the help of sprayer and brush.

Silkworm breed – All the 35farmers rear double hybrid (FC_1 x FC_2) silkworm.

Type of rearing – All the 35 farmers adopted shoot rearing technology.

Mountage - All the 35 respondents use pine dry twigs and plastic mountages for construction of cocoons.

3.13 Cocoon Yield / 100 DFLs

Among 35 farmers, 4 farmers (11%) obtained more than 25 kg/100 DFLs and rest of the 31 farmers (88%) had medium yield between 5-14 kg, respectively.

3.13 Knowledge and Adoption of Sericultural Technologies

The data on the knowledge and adoption of sericultural technologies by the farmers of Tehsil Haveli, Poonch District are tabulated in Table 3.

3.14 Mulberry Production Practices

All of the farmers (35) didn't fully understand the benefits of using the suggested variety (Chakmajra) and plant spacing. Despite the fact that all farmers (100%) were aware of the recommended dosages of manures and fertilisers, only 12 (34 percent) and 23 (65 percent) of them had fully adopted them. Additionally, all of the farmers (35 of them) lacked complete knowledge of weeding and irrigation, but 14 (40%) and 21 (60%) had only partial adoption, respectively. Furthermore, none of the farmers had complete understanding of mulberry pruning and harvesting, but 31 of them used it, and the other 4 only partially, in contrast to 100% adoption of mulberry shoot harvesting.

3.15 Silkworm Rearing Practices

All of the sericulturists (35) had no knowledge of CRCs or rearing houses, and all (35) of the farmers had adopted rearing houses to some extent. 100% of the farmers purchased silkworms from CRCs. Despite the fact that no farmer had full understanding of the sanitation and hygiene procedures used when raising silkworms, 27 farmers (or 77 percent) had adopted certain sanitation procedures, while only 8 (or 22 percent) had no awareness of these procedures. All of the farmers (35) lacked complete knowledge of silkworm bed spacing and shot rearing methods. Additionally, all farmers used the shoot rearing technique, but only 27 of them (or 77 percent) used bed spacing for silkworms, and 8 of them (or 22 percent) were unaware of it. Although only a few of the 35 farmers had any experience of cleaning the silkworm bed. In the study area, only 15 farmers (42 percent) had partial adoption of ventilation knowledge, while 20 farmers (57 percent) had no understanding of ventilation at all. However, none of the responders possessed complete knowledge, only partial understanding, of maintaining temperature and related humidity. All

35 farmers (100%) in the study region had only rudimentary understanding of bed disinfection and moulting care. Although all of the farmers (35) were aware of the ideal times for mounting silkworms and extracting cocoons, none of them used the recommended techniques. All of the sericulturists (35) knew how to process and transport cocoons for marketing, and they had fully embraced (100%) the new technologies. However, 8 (22%) of the farmers have some understanding of IPM for uzi fly and mulberry pests; as a result, these respondents have adapted local methods of the technology.

The following paragraphs analyse the findings of the studies on "Socio-economic status on knowledge and adoption of sericultural technologies among the farmers of Tehsil Haveli, Poonch District in light of preceding works.

3.16 Socio-Economic Status of Sericulturists

Age is a highly significant characteristic that has a significant impact on a person's social and personal life. Farmers' ages range from young to old in this survey, and it was found that 24 farmers (68 percent) were older than 65, 9 farmers (25 percent) were in the middle of their lives, and 2 farmers (5 percent) were younger. Regarding schooling, out of the 35 farmers, 9 (or 25 percent) were illiterate, followed by 25 (or 71 percent) who were in the fifth through tenth grades, and 1 (or 2 percent) who were in the secondary level (11-12th standard). In terms of family size, the majority of respondents (31) (88%) had a medium family (7 people), while 4 (11%) had a large family (>7). According to the survey, out of 35 farmers, 2 (or 5%) have large land holdings (2-4 acres), 5 (or 4%) have medium-sized holdings (up to 5 acres), and 28 (or 80%) have small holdings (under 2 acres). Regarding the main occupation, the survey found that agriculture and sericulture were both farmers' main occupations. Of the 35 respondents, 34 farmers (97%) reported having an occupation in agriculture and sericulture, while only 1 farmer (2%) was involved in a company. Regarding social participation, none of the farmers were a part of self-help groups, nor did any of them own memberships in any organisations or hold office jobs.

Table 1. Socio-economic status of sericulturists in Tehsil Haveli, Poonch District N = 35

Sl. No.	Category	Criteria	No. of Farmers	Percentage (%)
		1. Age (in years)		
a	Young	< 30	02	05
b	Middle	<40	9	25
c	Old	>40	24	68
		2. Education (in standards)		
a	Illiterate	0	9	25
b	Middle	5-10	25	71
c	Secondary	11-12	1	2
		3. Family size (No.)		
a	Big	>7	4	11
b	Medium	<7	31	88
		4. Land holding (Acres)		
a	Big	>4	2	5
b	Medium	2-4	5	14
c	Small	<2	28	80
		5. Primary occupation		
a	Agriculture with Sericulture	-	34	97
b	Business	-	1	2
		6. Experience in Sericulture		
a	More	15-20 years	12	34
b	Medium	10-15 years	3	8
c	Less	5-10 years	10	28
d	Very less	<5 years	10	28

Table 2. Adoption of mulberry and silkworm rearing practices by the sericulturists of Tehsil Haveli, Poonch District No: 35

	A.	**Mulberry Production Practices**		
1.	**Area (Acres)**			
a.	Big	>0.25	3	8
b.	Medium	<0.25	33	94
2.	Variety	Chakmajra	35	100
3.	Spacing	3'x3'	35	100
4.	Irrigation Source	Canal	0	0
		Bore-well	0	0
		Rainfed	35	100
	B.	**Silkworm Rearing Practices**		
1.	Floor	Cement	0	0
2.	Wall	Brick	0	0
3.	Roof	Thatched roof	23	65
		Tin roof	12	34
4.	Entrance	Separate	0	0
		Common	35	100
5.	Disinfection	Power sprayer& Brush	35	100
6.	Silkworm breed	Double hybrid (FC_1 x FC_2)	35	100
7.	Type of rearing	Shoot	35	100
8.	Mountage	Pine dry twigs	29	82
		Plastic mountages	6	17
	C.	**Cocoon Yield (kg/100 DFLs)**		
a.	High	25	4	11
b.	Medium	5-14	31	88

Table 3. Knowledge and adoption of sericultural technologies by the farmers of Tehsil Haveli, Poonch District N=35

Sl. No.	**Technology**		**No. of farmers**			**Percentage (%)**		
			Full	**Partial**	**Nil**	**Full**	**Partial**	**Nil**
	A.	**Mulberry Production Practices**						
1	Variety	Knowledge	35	-	-	100	-	-
		Adoption	-	-	35	-	-	100
2	Spacing	Knowledge	35	-	-	100	-	-
		Adoption	-	-	35	-	-	100
3	Manures	Knowledge	-	12	-	-	34	-
		Adoption	-	-	35	-	34	100
4	Fertilizers	Knowledge	-	12	-	-	34	-
		Adoption	-	-	35	-	34	100
5	Weeding	Knowledge	-	14	-	100	40	-
		Adoption	-	-	35	-	-	100
6	Irrigation	Knowledge	-	-	35	100	-	100
		Adoption	-	-	35	-	04	100
7	Pruning	Knowledge	-	31	-	-	88	-
		Adoption	-	-	35	-	-	100
8	Harvesting of mulberry	Knowledge	-	31	-	-	88	-
		Adoption	-	-	35	100	-	100
	B. Silkworm Rearing Practices							
9	Rearing House	Knowledge	-	35	-	-	100	-
		Adoption	-	-	35	-	-	100
10	Chawki from CRC's	Knowledge	-	-	35	100	-	100
		Adoption	-	-	35	100	-	100

Sl. No.	Technology		No. of farmers			Percentage (%)		
			Full	Partial	Nil	Full	Partial	Nil
11	Disinfection	Knowledge	-	27	-	-	77	-
		Adoption	-	-	35	-	-	100
12	Hygiene	Knowledge	-	27	-	-	77	-
		Adoption	-	-	35	-	-	100
13	Shoot rearing	Knowledge	-	35	-	-	100	-
		Adoption	-	-	35	-	-	35
14	Bed spacing	Knowledge	-	27	-	-	77	-
		Adoption	-	-	35	-	54	100
15	Bed cleaning	Knowledge	-	35	-	-	100	-
		Adoption	-	-	35	-	-	100
16	Ventilation	Knowledge	-	15	-	-	42	-
		Adoption	-	-	35	-	-	100
17	Temperature & humidity	Knowledge	-	35	-	-	100	-
		Adoption	-	-	35	-	-	100
18	Moulting care	Knowledge	-	35	-	-	100	-
		Adoption	-	-	35	-	-	100
19	Bed disinfection	Knowledge	-	35	-	-	100	-
		Adoption	-	-	35	-	-	100
20	Mounting of silkworms	Knowledge	-	35	-	-	100	-
		Adoption	-	-	35	-	-	100
21	Harvesting of cocoons	Knowledge	-	35	-	-	100	-
		Adoption	-	-	35	-	-	100
22	Cocoon sorting	Knowledge	-	35	-	-	100	-
		Adoption	-	-	35	-	-	100
23	Transportation of cocoons	Knowledge	-	35	-	-	100	-
		Adoption	-	-	35	-	-	100
24	IPM of mulberry pests	Knowledge	-	8	-	-	22	-
		Adoption	-	-	35	-	-	100
25	IPM of uzi fly	Knowledge	-	8	-	-	22	100
		Adoption	-	-	35	-	-	100

According to the survey, out of 35 farmers, 2 (or 5%) have large land holdings (2-4 acres), 5 (or 4%) have medium-sized holdings (up to 5 acres), and 28 (or 80%) have small holdings (under 2 acres). Regarding the main occupation, the survey found that agriculture and sericulture were both farmers' main occupations. Of the 35 respondents, 34 farmers (97%) reported having an occupation in agriculture and sericulture, while only 1 farmer (2%) was involved in a company. Regarding social participation, none of the farmers were a part of self-help groups, nor did any of them own memberships in any organisations or hold office jobs. According to Siddappaji et al. [50], in the Mysore District, 59 percent of the respondents were literate, of whom 3, 17, and 24% had degrees or had only received an elementary or secondary education, while the remaining 41% were illiterate. According to Kshama Girdhar et al. [51], 68.4% of the male members (n=519), 120 of whom worked full-time and 235 part-time, were involved in sericulture, compared to 59.8% of the female members. Among them, 103 worked full-time and 156 did so part-time. Additionally, they reported that 37.61 percent of people lacked a high school diploma, followed by 21.3 percent and 31.4% of those with only an elementary education.

3.17 Mulberry and Silkworm Rearing Practices

Regarding mulberry production methods, out of 35 farmers, 5 (14%) have a medium land source (2-4 acres), while 28 (80%) have a smaller land source (2 acres). Additionally, they all grew the Chakmajra mulberry type by keeping a 3'x 3' plant spacing. Regarding irrigation, all farmers rely on rain to water their mulberry gardens, or rain-fed mulberry plantations. All the farmers used mud and stone to build their rearing buildings, which had a thatched or tin roof. The bulk of the farmers, or 23 farmers (65 percent), had thatched roofs, while the remaining 12 farmers (34 percent), had tin roofs. Each of the 35 farmers had a shared entryway. Every single one of the 35 farmers disinfects their fields with a sprayer and brush (100%) in this study.

Additionally, all farmers use shoot feeding technology to raise FC1 x FC2. 35 farmers were involved; 6 utilised plastic mountages (17%), while 29 (82%) used dry pine twigs for cocooning. Regarding cocoon yield per 100 DFLs, 4 farmers (11%) reported more than 25 kg, while the remaining 31 farmers (88%) obtained cocoon output between 5 and 14kg. Adoption is the choice made by a person to carry forward an innovation. An idea or goal that a person perceives as novel may be called an innovation [52]. Rao and Moulik [53] came to the conclusion that incomplete nitrogenous fertiliser application was caused by ignorance. Somasundaram [54] found no evidence of a connection between small farmers' socioeconomic position and adoption. According to Krishnaswami et al. [55], sericulturists may produce an average yield of 27.72 kg/100 DFLs in rainfed locations by implementing improved methods of rearing. According to Kher et al. [56], when education (formal, informal, or non-formal) increases, farmers would adopt more technology. According to Dolli et al. [57], the lack of acceptance or partial implementation of new methods was the primary cause of the poorer productivity, smaller cocoon yield per unit area, and lower number of layings brushed.

3.18 Knowledge and Adoption of Sericultural Technologies

100% of farmers used both approaches in terms of understanding and adoption of mulberry variety and plant spacing. Regarding manures, although none of the respondents were aware of them, 12 farmers (34 percent) who are adopted had some information, and the remaining 23 farmers (65 percent) were not. In a similar vein, none of the farmers have a thorough understanding of the significance and frequency of fertiliser application to mulberry, and only 12 farmers (or 34% of them) have fully embraced the technology. All of the farmers were unaware of the practises of weeding, irrigation, pruning, and mulberry harvesting. Of the 14 farmers who partially adopted the practise of weeding, for irrigation, none of the farmers practise irrigation, for pruning, 31 farmers (88 percent), and for mulberry harvesting, 31 farmers (88 percent). One hundred and thirty-five farmers were surveyed, and not one of them had any knowledge of rearing houses, chawki from CRCs, sanitation, hygiene, shoot rearing, bed spacing, bed cleaning, ventilation, moulting care, bed disinfection, mounting of silkworms, harvesting, sorting, or transporting cocoons. The adoption of these technologies varies, though, with the rearing house having a partially adoption rate of 35 (100%) farmers, disinfection at 27 (77%) farmers, hygiene at 27 (77%) farmers, shoot rearing at 35 (100%) farmers, bed spacing at 27 (77%) farmers, bed cleaning at 35 (100%) farmers, ventilation at 15 (42%) farmers, moulting care at 35 (100%) farmers, bed disinfection at 27 (77%) farmers, 9 (18%) farmers, mounting at 35 (Regarding awareness and adoption of temperature and humidity, IPM of mulberry pests, and IPM of the uzi fly, none of the farmers lacked understanding about these technologies and as a result, 8 (22%) of them were implemented.

Somasundaram [54] found no evidence of a connection between small farmers' socio-economic position and adoption. According to Krishnaswami et al. [55], sericulturists may produce an average yield of 27.72 kg/100 DFLs in rainfed locations by implementing improved methods of rearing. Based on a research study carried out in a rural town in New York, Coleman [58] reported that there was no significant correlation between the age of respondents, their degree of knowledge, and their adoption. According to Wilson and Gallup's research from 1955, farmers in the medium age bracket used more techniques. According to Sudhakar Rao [59], younger and middle-aged farmers had a more favourable impression of uzicide's complexity than older farmers, who were typically more focused on traditional techniques.

4. SUMMARY AND CONCLUSION

During the research, more farmers were found to be older, while fewer were found to be younger. In terms of education, more farmers fell into the medium group, while fewer fell into the illiterate category, and just one of them completed secondary education. When it comes to family size, the majority of respondents have medium-sized families, while only a tiny minority have large families. In terms of land ownership, the majority of farmers have few sources of land, while the majority of farmers have small-scale sources of land [60-63]. All of the respondents' principal occupations were in agriculture, with sericulture being the only farmer involved in business. Additionally, none of the respondents had membership in a societal organisation, and none of the farmers were office holders. Regarding experience in sericulture, there are a noticeable majority of farmers with medium experience and a minority with less experience.

Regarding mulberry production methods, the majority of farmers have medium-sized land sources, while a small number of farmers have smaller land sources. In addition, all of the farmers have Chakmajra mulberry gardens with 3'x3' plant spacing. Regarding irrigation, all mulberry gardens were rainfed, and none of the farmers used any irrigation techniques. Regarding silkworm growing techniques, all of the farmers built their houses out of mud and stone, and the majority of them had thatched roofs, but none of them had RCC rearing houses. All farmers use a sprayer and brush to disinfect their fields, and all responder's rear double hybrid (FC1 x FC2) silkworms using the shoot method. Additionally, all farmers use pine dry twigs and plastic mountages. In terms of cocoon productivity, the majority of farmers achieve medium yield, while a small number of farmers achieve average yieldNo farmer has knowledge of, or has adopted, any of the following practises: variety, spacing, manures, fertilisers, weeding, irrigation, pruning, harvesting of mulberry leaves, rearing house, chawki from CRCs, disinfection, hygiene, shoot rearing, bed spacing, bed cleaning, ventilation, moulting care, bed disinfection, mounting, harvesting of cocoons, sorting, and transportation of cocoons. The farmers do not fully understand IPM for mulberry pests and IPM for uzi fly, however, and as a result, these technologies are not partially embraced by them .

FUTURE PROSPECTUS FOR SUSTAINABLE SERICULTURE DEVELOPMENT IN POONCH DISTRICT

For sustainable Sericulture development in Poonch area of Jammu and Kashmir following are to be considered:

Areas of Strength

- Ideal climate for quality Bivoltine cocoon production.
- Can generate direct and indirect employment.
- Agro-based industry which requires small investment.
- Raw material for fabrication of equipment required is locally available at low cost.
- The required skills are learnable in short duration.
- The activity can be pursued at home or village level.
- The raw material produced in the form of leaf, cocoon and fibre can be easily utilized within the villages and marketing at every stage of production is not required, only final product cocoon or silk is marketed once the industry is developed in the area.
- Demand is higher as compared to production.
- Only industry of state for which raw material is available locally.
- Suitable for marginal tribal Poonch farmers.
- Eco-friendly/ harmonious/salubrious nature of Sericulture.
- Silkworm cocoon is the only cash crop for which minimum support price is available.
- Proved and established production of good quality cocoons possible at Poonch.
- Most of the area of Buffliaz like Chandimarh, Behramgala beside Mandi Sawjian is under mono cropping pattern.
- In general, farmers are mostly economically backward.
- Cultivable waste land still occupies large area in the district.
- Predominant small & scattered land holdings with a average size of 0.2 Ha.
- Undulated topography unsuitable for high farm mechanization, Water conservation & retention.

Areas of Weakness

- Inadequate mulberry wealth.
- Scattered/un-maintained age old mulberry trees.
- No infrastructure with farmers.
- No training at farmers level.
- No knowledge about use of mulberry and silkworm rearing.
- No separate rearing houses.
- Small land holdings.

Thrust Areas

The Following thrust areas have been identified:

- Systematic development and strengthening of silkworm seed production ensuring healthy commercial seed and guaranteed production the SDD, J&K has to follow the seed production norms of NSSO for improving the seed production efficiency.
- Improvement in productivity of mulberry through soil enrichment adopting eco-friendly measures.
- Infrastructure development to meet the industry's requirement at all the levels of

stakeholders starting from the primary producers to the processers of the end product.
- Knowledge building and skill up gradation through well-organized training programmes at all levels of participants of the industry.
- Frequent occurrence of calamities like hail storms, incessant torrential rains besides floods and moisture stress due to prolonged dry spells.
- Increasing farmers inability to invest in agricultural production system
- Increased incidence of insect – pest and disease complex.
- Declining inability to invest in agricultural production system.
- Shrinking Land holdings.

Vision

- To create livelihood opportunities for tribal families of Poonch in Sericulture.
- To contribute in achieving production target of raw silk production of J&K UT.
- To encourage tribal women empowerment on large scale in Poonch.
- To make J&K State single largest producer of bivoltine silk in the country.
- To develop sustainable livelihood model based on mulberry sericulture for tribal areas in Poonch.
- To transfer best technologies and practices to the tribal rearers, reelers and weavers.
- To provide market support to stake holders.

Policy Initiatives

To achieve the above set goals and targets, the recommendations for bivoltine cocoon production in Poonch district of Jammu and Kashmir are enumerated in the following paragraphs: Establishment of Research cum Extension centreby Central Silk Board, Ministry of Textiles, Government of India, Bangalore at Poonch in order to ensure:

- Constant up gradation of productivity and quality of silkworm breeds and mulberry.
- Device practices for improving soil health and fertility and cultivation practices to constantly improve the productivity and quality of mulberry.
- Protection of food plant and cocoon crop from various pests and diseases.
- Development of economic farming models and practices towards optimum utilization of resources and reducing the cost of production aiming at self-sustainability.
- Imparting knowledge and skills to the grass-root level extension workers and the stakeholders.
- A rational programme of manuring of old plantation should be taken.
- For achieving immediate results and increasing bivoltine cocoon production by resorting to multiple cropping in Sericulture, increase in mulberry wealth of Poonch is a MUST and the farmers should be induced to take up mulberry plantation of improved varieties in private lands by making Sericulture a profitable and attractive occupation.
- For ensuring better survival percentage of plants the Department of Sericulture should select proper sites before plantation as it is observed that the percentage survival of the plantation is very poor.
- Plants need to be planted after taking into consideration the soil conditions.
- The pits should be dug for the plantation purposes by the month of December. Substandard pits dug at the time of plantation season and the plants simply dumped into these pits results in the failure of plantation and low survival.
- Ascertain adoptability of different mulberry varieties and stop distribution of only one variety (Chakmajra) types without as to which variety can thrive in Poonch District.
- The plants uprooted from the nurseries should be transported to the destination without delay to ensure their better survival in the field.
- Establishment of Chawki gardens for Chawki rearing (upto second moult). If the operation of Chawkie rearing is carried on rational lines the production of cocoon will increase at least by 25 per cent.
- Maintenance of hygrothermic conditions for the healthy growth of silkworms.
- The Chawkie worms should be distributed in accordance with the performance, manpower and leaf availability with the silkworm rearer in Poonch District.
- The female workers should be encouraged in rearing silkworms, this will help in improving quality as is being done in other advanced countries like China.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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