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Analysis of Sericulture in Himachal Pradesh: A Case Study of Kangra District in Himachal Pradesh (India)

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Abstract:
Sericulture is an art of rearing silkworm from the production of silk and bi product. Sericulture being an agro-based enterprise plays a predominant role in shaping the economic destiny of the rural people and fits very well in India's rural structure, where agriculture continues to be the main industry. Being a labour intensive rural based industry it offers a qualitative and quantitative change in the poverty alleviation with a chain creation of employment from unskilled farm labourers to skill artisans to all sections rural. The study has been undertaken to analysis of sericulture industry in H.P: A Case Study of Kangra District. To find out economics in sericulture industry and problem faced by the rearers, a sample survey was conducted. For this, a well structured questionnaire was constructed and response collected from the 50 rearers from Kangra district of H.P. The finding of this study shows that government should take suitable steps to improve the sericulture industry which automatically improve the standard of living and increase the number of rearers in this activity.

Keywords: *Sericulture, Economics, Problems*

1. Introduction

Sericulture is derived from the word *Su* and *Si* which means silk in Chinese. In sericulture Seri means *silk* and culture means *rearing*. Therefore, sericulture is an art of rearing silkworm for the production of silk and other biproducts. The word silk sounds luxury and class. Till today no other fabric can compete with silk with respect to lustre and elegance. Sericulture is the undisputed queen of textile. Sericulture offers options for communities in the economically marginal category because it requires small investment and gives high return. It provides means of livelihood to large sections of the society i.e. mulberry cultivator, co-operative rearer, farmer cum rearer, reeler, twister, weaver and hand spinner of silk waste. Sericulture is a women-friendly occupation. Female participate in sericulture activities reduces migration of rural people. So, sericulture is an ideal occupation for the weaker sections of society. Sericulture is an eco – friendly industry. It exhibits harmony between mankind and nature and show that how natural resources have been used by villages without disturbing the ecology.

2. History of Sericulture

According to the historians, sericulture was originated in china. The empress Si Ling Shi wife of emperor Huang-Ti patronized the silk industry around 2640BC. Chinese kept the secret of sericulture for several hundred years and under imperial decreed death by torture to those who disclosed the details of sericulture. According to some historians, Korea was first country after China to learn the detail of sericulture when the Chinese immigrants introduced sericulture in the land of Korea about 1200BC. In England this industry was started in the 14thcentury. However, effective efforts were made to flourish the sericulture industry in Britain during 16th century only. In 1825 A.D. various steps were taken to introduce sericulture in Ireland. Silk industry has a comparative advantage in those regions which are climatically suitable for the growth of silkworm and where cheap and skilled labour force is available. Silk has been mentioned in Hindu epics more than 2000 years ago[i] According to the historians, a Chinese princess got married to a king in Tibet in around 140BC.Some eggs of silkworms and mulberry seed hidden in the head dress were brought with her to Tibet. Later, the Sericulture spread from Tibet to India. Prior to 19th century, sericulture was mostly confined to northern and eastern India and only during the twentieth century, it spread to the southern peninsula which is now the major sericulture zone in India In India, because of the prevalence of favourable climate condition, mulberry is cultivated mainly in five states viz. Karnataka, Andhra Pradesh, Tamil Nadu, West Bengal and Jammu Kashmir. These five states collectively account for 97percent of total area under mulberry cultivation and 95 percent of raw silk production in the country. Now as result of growing realization, sericulture is gaining popularity in non-traditional areas too viz. Assam, Andhra Pradesh, Bihar, Uttarakhand and Himachal Pradesh. India is the only country which is producing all the four commercial known varieties of silk (1) Mulberry (2) Tasar (3) Muga (4) Eri. Many suitable steps have been taken to develop this industry. The government of India set up Central Silk Board in 1949 to suggest the suitable measures for the development of sericulture. Today, India is the second largest producer of silk and contributes about 18 percent of the world raw silk production. During the year 2010-11, total production of all the varieties of raw silk was 20,410MT compared to the production of raw silk 19,690MT in the year 2009-10, indicating an increase of 3.7percent. The mulberry plantation of Bivoltine silk and Vanya silk has shown remarkable growth. The employment generated

by silk industry increased from 6.8 million persons during the year 2009-10 to 7.25 million people during 2010-11, registering a growth of 6.35 percent.

3. Review of Literature

Mattu et.al, (2000) have observed that sericulture can play an important role in the development of hilly areas as it helps in maintaining the environment balance. As a cottage based industry, it is an income generating activity for rural people of hills. There is tremendous scope for oak tasar culture, because it is forest based industry. But this industry is facing certain constraints like low fecundity, rate of moth, poor hatching and shortage of high yield silk worm. The rearers of oak tasar do not raise systematic food plant and they are dependent exclusively on trees available in the forest. So, better extension services and training are essential for the development of sericulture in the state. In the absence of proper training, rearers are not able to produce quality cocoons and cannot fetch a good price.

Kasa (2005) observed that sericulture is an agro-based industry and bought overall development of villages in Andhra Pradesh in spite of globalisation and liberalisation. Women play an important role in silk rearing and processing. Sericulture has been playing a vital role in transforming the traditional kind of agriculture into modernised agriculture. But this industry faces many problems for example insufficient financial support from government agencies. There are climatic hazards and wide fluctuation in cocoon prices. Further, lack of awareness and the absence of non-governmental organisations to market the product also increase the number of woes in the industry. So, to overcome these problems, some suitable steps like new varieties of mulberry, proper irrigation facilities, more grainage and care must be taken to enhance the productivity of sericulture industry.

Rani (2006) analysed that employment opportunities for rural women through sericulture in Rayalaseema region of Andhra Pradesh. Sericulture industry does not require any hard labour and rearing of silkworm is generally attended by women and old people and this activity does not require any sophisticated machinery. So, sericulture provides gainful employment to women and has occupied a significant place in the area development strategies and programmes of government of India as well as state government of Andhra Pradesh. It is highly profitable income generating activity to alleviate the status of rural poor especially women.

Bhatnagar and Bhatnagar (2008) analysed the status of mulberry silk production in India. Growth in area under mulberry cultivation, production and productivity of raw silk, reeling of cocoon and production of silk waste was studied. It was observed that though, the area under mulberry cultivation remained same yet the production of silk waste has increased. Reeling of cocoons has almost double whereas; the silk waste has also gone more the 2.5 times in the period 1980-81 to 2004-05. So, in order to expand sericulture industry, silk waste need to reduce and more and more area should bring under mulberry cultivation.

Balakrishanappa and Rajan (2010) have observed that sericulture is one of the prominent enterprises, which provided full time employment to the entire family, offering high income and better standard of living. It was observed that the middle age farmers used improved technologies than the old age people. Due to the adoption of new technology the production of cocoon also increased, which increased the income and standard of living. So, in order to increase the sericulture activity, the government popularise the mass media so that farmer will aware with the recent development in the technology of sericulture.

Soni et.al, (2011) observed that sericulture is an income generating agro-enterprise in the mid hill regions to alleviate poverty through increasing women employment and income. Sericulture is that activity where most of the activities are carried out by women alone. But their contribution is invisible because of lack of women oriented approaches in research and location of training etc. put a constraint on women participation. To improve the sericulture industry and the contribution of women, various suitable steps should be taken up like women's focused new technologies need to be evolved. In addition to this, health insurance, promotion of bio-fertilizers and bio-pesticides needs to be promoted in the sericulture industry.

Shukla and Ruchika (2012) observed that sericulture economics motivates new farmers to take up sericulture and increase their income. It needs low capital and provides year round employment. In order to reduce the cost of production, the farmers should be motivated and demonstrated with the adoption of new bivoltine sericulture techniques. The seri-culturist should be educated about the optimum use of input such as fertilizers, pesticides etc. All these steps can uplift the standard of living of rural people and increase the productivity of silk industry

3.1. Sericulture in Himachal Pradesh

Himachal Pradesh is treated as non-traditional state in sericulture. Sericulture in Himachal Pradesh has a long historical background. Although this state is not a comparatively large producer of silk, yet it has been noted country wide for its quality silk. The agriculture is the main occupation but the land holding of the farmers are very small which restrict the cultivation of field crops. A large number of people adopt sericulture as a part time job in the state. Sericulture is an occupation which requires no energy, and it has small gestation period and needs small investment which potential for relatively high returns. Sericulture is fast emerging as an important rural cottage industry in the state. Sericulture is practiced in the seven districts in Himachal Pradesh i.e. Bilaspur, Hamirpur, Shimla, Kangra, Una, Mandi, Sirmour. The sericulture department has to assume the responsibility and enjoys the monopoly position with respect to supply of silkworm seed to the chowkie rearing centres. There is only one grainage in Himachal Pradesh at Palampur. There are 83 mulberry farms in Himachal Pradesh. The sericulture department supplies silkworm under the controlled climatic condition to the chowkie rearing centres for rearing purpose. The controlled climatic condition in chowkie rearing centres ensure better survival of infant worm and then these silkworms are supplied to the rearer for further process. There are 72 sericulture chowkie rearing centres in the state. Silkworm cocoons are perishable and hence should be reeled as early as possible. So, sericulture department provides expert advice and inputs to properly organise silk reeling centres to reel the yarn from the cocoon produced by rearers. There is only 1 silk reeling unit owned by the state government and other 7 silk reeling units are owned by the private sector. Out of these 7 reeling units, 3 are in Kangra, 2 in Bilaspur and each is in

Mandi and Hamirpur. The entire cocoon produced by the rearer is purchased by this industry as per the quality of cocoon. Sericulture goes very well with the small and marginal farmers, attempts may be made in the planning process to motivate these groups to adopt silkworm-rearing. Sericulture is an agro-based labour intensive rural cottage industry, this is providing subsidiary employment to the rural people and income by way of rearing silkworms for production of silk cocoons. Himachal Pradesh is noted countrywide for quality of bivoltine silk cocoons it produces. This has been possible because of the suitable climate in the state for production of quality bivoltine silk cocoons. Large rural base in the state- implies an opportunity to generate rural employment under sericulture. Government policy of India and the states, has always given substantial importance for the development of labour intensive and eco-friendly industries like sericulture. A **'Sericulture Wing'** under the state Industries Department was set up in the year 1951 to promote the development of sericulture industry Directorate of Industries (Sericulture wing), Department of Industries, and Government of Himachal Pradesh.

3.2. Methodology and Objectives

In the present study both primary data collected to analyse the growth and various problems of sericulture industries in Himachal Pradesh. There are in total 89 mulberry farms in the state. Out of these 24 farms are in district Kangra. On the basis of purposive sampling district Kangra will be selected for an intensive analysis of the various problems being faced by mulberry farms at the grass root level. A structured scheduled will be canvassed on all the 24 farms to know the problems of seri-culturist.

3.3. Sericulture in Kangra District

The district has considerably diversity in its soils, physiographic, land use pattern and cropping system. The district has mixed topography comprising of plain land valleys and hills. The soils of district vary in texture from loam to sandy loam, acidic and non-calcareous and moderate to high in organic matter. The Beas, one of the districts largest rivers, contributes much to the fertility of land but due to the hilly terrain, not much of it is cultivated. The whole district is full of uniform patches of barren land, interspersed with small forests. Even so, the economy consists mostly of agriculture and farming, with tea cultivation in particular contributing a vital role in the revenue. The agro-ecological situation varies from sub – tropical to wet/dry temperate regions. The monsoon rain is heavy and about 70 percent of total rain fall is received from July - September. But the state suffer from natural limitation like peculiar topography, agro climatic condition and size of holding which restrict the scope for industrialisation and production of agricultural crops, but it offers moderate agro climatic condition and abundant labour force for practising sericulture in lower and mid altitude areas of state. These mulberry plantation provides employment to the people. The people can adopt this activity as a part time job, which help to raise the socio-economic condition of the weaker section of people.

4. Socio-Economic Profile of Silkworm Rearers

Age	Male	Female	Total Rearers	% of Total Rearers
30-40	13(39.39%)	20(60.60%)	33	22
41-50	18(42.85%)	22(52.38%)	42	28
51-60	32(53.33%)	30(50%)	60	40
Above 60	5(33.33%)	10(66.66%)	15	10

Table 1

4.1. Age Wise Distribution of the Rearers

It was observed that in the age group 30 to 40, there were more female i.e. 20(60.60%) than the males. In the age group of 41 to 50, also the some trend was observed that, there were more females i.e. 22(52.38%) than male rearers i.e. 18 (42.85%). In the age group of 51 to 60, there were 5 males and 10 female rearers. At an aggregate level it means that the number of female rearers (82) was more than that of the males (68).

Education	Female	Male	Total Rearers	% of Total Rearers
Illiterate	5(38.46%)	8(61.39%)	13	8.67
Primary	4(44.44%)	5(55.56%)	9	6
Middle	15(57.14%)	21(42.86%)	36	24
Under Matric	11(26.83%)	30(73.17%)	41	27.33
Matric	20(52.63%)	18(47.37%)	38	25.33
Under Graduate	13	0	13	8.67

Table 2

4.2.Education Status of the Rearers

In Table 2, education status of the sampled rearers is exhibited. Out of 150 rearers, 13(8.67%) were illiterate, 36(24%) of the respondents were under middle and 41(27.33%) were under matric. There were 38 (25.33%) respondents who were matriculate and remaining 13 (8.67%) were under graduate, meaning thereby, that 16(32%) rearers

4.3. Land Wise Distribution of the Rearers

In Table 3, 5 had land less than 5 kanals. However, majority of rearers i.e. 16 had land between 5 to 10 kanals. Another 22 (14.67%) and 26 (17.33%) rearers each possessed land between 10.1 to 15 kanals and 15.1 to 20 kanals respectively. In the case of rearers, having land between 25.1 to 30 kanals and 30.1 to 35 kanals, there were 18 and 14 rearers. There was only one female rearer who possessed land more than 50 kanals

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Land (in kanal)	Male	Female	Total rearers	% of total rearers
0 - 5	2	3	5	3.33
5.1 – 10	7	9	16	10.67
10.1 – 15	10	12	22	14.67
15.1 – 20	15	11	26	17.33
20.1 – 25	13	20	33	22
25.1 – 30	10	8	18	12
30.1 – 35	5	9	14	9.33
35.1 – 40	4	5	9	6
40.1 – 45	2	4	6	4
45.1 – 50	0	0	0	0
Above 50	0	1	1	0.67

Table 3

5. Economics of Sericulture Activities

5.1. Area Left per Rearer for Mulberry Cultivation

Land (kannal)	No. of rearers	Total Land Possessed by Rearers	Area Left for Mulberry	% of Area Left for Mulberry
0 – 5	5	19.5	6	30.77
5.1 – 10	16	154	31	20.13
10.1 -15	22	240	110	45.83
15.1 – 20	26	420	140	33.33
20.1 -25	33	698	264	37.82
25.1 – 30	18	342	126	36.84
30.1 – 35	14	450	130	28.89
35.1 – 40	9	342	150	43.86
40.1 -45	6	215	100	46.51
45.1 – 50	-	-	-	-
Above 50	1	100	20	20

Table 4

In Table 4, reveals the relationship between land possessed and land left for mulberry plantation. The farmers who possessed 19.5 kanals of total land and whose holding lied between 0 to 5 kanals left 6 kanals (30.77%) of their total area for mulberry plantation. The other 16 rearers who collectively possessed 154 kanals of land and whose land holding lied between 5.1 to 10 kanals, left their total land20.13% for mulberry plantation. The next 22 rearers whose land holding lied between 10.1 to 15 kanals left 45.83percent of their land for mulberry plantation. Further, 26 rearers who possessed land between 15.1 to 20 kanals kept 33.33% of land for mulberry plantation. from 0- 5 kanals to 20.1 to 25 kanals of land holding, as the land possessed increase, the area left for mulberry plantation per rearer in absolute term also increase. The 9 rearers whose land holding lied between 35.1 to 40 kanals of land left 150 kanals (43.86%) of land for mulberry plantation. **Source:** as per table .1

5.2. Number of years engaged in Sericulture:

Years	Male	Female	Total Rearers	% of Total Rearers	% of Male Rearers	%of Female Rearers
5 – 10	10	7	17	11.33	14.70	8.54
11 – 15	15	13	28	18.66	22.05	15.85
16 – 20	25	20	45	30	36.76	24.39
21 – 25	10	27	37	24.67	14.70	32.93
26 – 30	5	10	15	10	7.35	12.22
<30	3	5	8	5.33	4.41	6.10

Table 5

Out of 150 respondents, 17 (11.33%) of rearers revealed that they were engaged in this activity for last 5 to 10 years. Out of these 10 were males and 7were females. Again there were 28 such rearers who were in this activity for last 11 to 15 years. Forty Five (30%) rearer were engaged in this profession for last 16 to 20 years and out of these 20 (24.39%) were females and 25 (37.76%) were males. There were 37 rearers who engaged in this activity for last 21 to 25 years. There were 15 (10%) rearers who were engaged in this activity for last 26 to 30 years. Further, 8 (5.33%) rearer were found to be engaged in this activity for last more than 30 years. Thus the majority of the rearers are engaged in this activity more than15 years.

Income	Total Rearers	Total Income	Income per Rearer
500 – 1000	-	-	-
1001 – 2000	20	35900	1795
2001 – 3000	24	76800	3200
3001 – 4000	38	144000	3789.47
4001 – 5000	31	145500	4693.55
5001 – 6000	27	148000	5481.48
6001 – 7000	10	65000	6500

Table 6: Income of Rearers in Autumn

Income	Total Rearers	Total Income	Per capita Income
500 – 1000	0	0	0
1001 – 2000	1	1750	1750
2001 – 3000	3	7750	2583.33
3001 – 4000	8	30500	3812.5
4001 – 5000	10	22500	4750
5001 – 6000	17	70750	5573.53
6001 – 7000	30	199750	6658.33
7001 – 8000	15	117500	7833.33
8001 – 9000	35	303500	8671.42
9001 – 10,000	18	175000	9722.22
10,001 – 11,000	13	140000	10769.23

Table 7: Income of the rearers in Spring Season

5.3. Income of Rearers in Spring Season and Autumn Season

An attempt is also made to make a comparison of income of sampled rearers in autumn and spring season. The analysis reveals certain important findings. Firstly, in the autumn season, there were 20 rearers who earned income between Rs1001 to Rs2000. In contrast, there was just one rearer who earned so little from silkworm rearing in spring season. Again in the autumn season, 24 rearers earned income between Rs2001 to Rs3000 but, in the spring season again there were only 3 rearers who earned so little income. Meaning thereby, that where as in the autumn season majority of rearers i.e. 44 (29.33%) on an average earned between Rs.500 to Rs 3000 and there were only 96 (64%) rearers who earned between Rs.3001 to Rs.6000. There are only 10 rearers who earned income between Rs6001 to Rs 7000. In the contrast, the income earned by the rearers in spring season is more the the income in autumn season. There were 30 rearers who earned income between 6001 to Rs.7000. In terms of income per rearer, within the income group of Rs.2001 to Rs.3000 it means that whereas, in the autumn season the income per rearer on an average is Rs.3200, in spring season it is Rs.2583.33. Further, within the income group of Rs.3001 to Rs.4000, income per rearer in autumn season is Rs.3789.47, in spring season it is Rs3812.5. There was not even a single rearer in autumn season who could earn more than Rs. 7000. In contrast, in spring season there were 81(54%) rearers who earned more than Rs.7000.

Oz K.G	½ OZ.		1 Oz.		Total		Total Rearers	% of Total Rearers
	Male	Female	Male	Female	Male	Female		
0 – 10	0	0	0	0	0	0	0	0
10 – 20	2	1	1	0	3	1	4	2.67
20 – 30	4	2	3	3	7	5	12	8
30 – 40	7	4	9	7	16	11	27	18
40 – 50	3	9	14	18	17	27	44	29.33
50 – 60	4	5	11	15	15	20	35	23.33
60 – 70	4	6	6	12	10	18	28	18.67

Table 8: Cocoon Production by the Rearers

In Table 8, cocoon production per male and female of the sample rearers is exhibited. The rearers are given ¼ Oz of seed, ½ Oz and1 Oz of silk seed for cocoon production. There were 4 females and 2 males who received ¼ Oz of seed. Out of this 1 female could produce something less than 10 Kg of cocoon. However, the other 5 (2 males and 3 females) could produce between 10 to 20 Kg of cocoons out of the same amount of seed. Further, majority of the rearers i.e. 37 were supplied ½ Oz of seed and out of these 7 (6 men and 1 female) rearers produced between 10 to 20 Kg of cocoons, 20 (10 males and 10 females) could produce 20 to 30 Kg of cocoon. Meaning thereby, that it is not merely the quantity of seed, which is important in cocoon production rather, it is the overall rearing skills and other complementary infrastructure, which is probably all the more important in this regard. This argument is further substantiated from this also than when 1 Oz of seed was supplied to 7 rearers, 3 of them (1 male and 2 females) could extract only 40 to 50Kg of cocoon. One male extracted 50 to 60 Kg of cocoons and the remaining 3 rearers succeeded to extract 60 to 70 Kg of cocoons.

6. Economic of Sericulture in Himachal Pradesh

Labour Cost Involved in Rearing One Oz of Seed	**Time Involved**	**Labour Cost Paid**
1. Late age rearing	10 mandays	Rs 1500
2. Spinning and Harvesting	4 mandays	Rs 600
Material Cost		
1. Silkworm Eggs	1 Ounce (Oz)	Rs 40
2. Waste Newspaper and Bamboo Mats		Rs 150
Total Cost		**Rs 2290**

Cocoon production per Oz of Spring Season 47.97 Kg in autumn season 34.89 Kg. (average)

Price Charged at a rate of Rs 150 per Kg = Rs5233.5

Price charged at a rate of Rs 150 per K =Rs 7195.50

Total Profit (5233.5-2290) = Rs 2943.50

Total Profit (7195.50-2290) = Rs 4905.50

7. Problems Relating to Silkworm Rearers

Problems	Male	Female	Total	% male	% female	% of Total
Small Land Holding	10	15	25	14.70	18.29	16.67
Lack of Irrigation Facilities	18	20	38	26.47	24.39	25.33
Non-availability of mulberry in surroundings	15	18	33	22.05	21.95	22
Non availability of mulberry leaves in chawkie rearing centres	10	20	30	14.70	24.39	20
Non Availability Of Adequate Silk Seed	8	15	23	11.76	18.29	15.33

Non-Availability Of Proper Place For Rearing	15	20	35	22.06	24.39	23.33
Shortage Of Appliance	18	25	43	26.47	30.49	28.67
Lack Of Visit Of Sericulture Staff	35	30	65	51.47	36.58	43.33
Infected by Grasserie And Flacherie Diseases	30	26	56	44.12	31.71	37.33
Attack Of Ants And Rats Etc.	35	30	65	51.47	36.58	43.33
Delay In Collection of Cocoon	40	60	100	58.82	73.17	66.67
Poor Cocoons price	68	82	150	100	100	100
Long Distance For Marketing Of cocoons	35	50	85	51.47	60.975	56.67
Non-Availability Of Training In Mulberry Cultivation	38	37	75	55.88	45.12	50
Non-Availability of training in silkworm rearing	40	37	77	58.82	45.12	51.33
Non-availability of sufficient credit facility By Department	68	82	150	100	100	100
Non-Availability Of Credit By The Government And Institution	68	82	150	100	100	100

Table 9

Mulberry is the main food plant of the silkworm. Farmers do not go for the systematic mulberry plantation practice and raise mulberry on the edges of their fields. The main problems of the rearers in raising mulberry are concerning their small land holding, lack of irrigation facilities and shortage of labour. In the Table, It was observed that 25rearers (16.67%) were of the view that because of their small holding they are unable to grow required number of mulberry in their land. Another 38 (25.33%) of the rearers were of the view that because of poor irrigation facilities they are not in a position to grow mulberry

7.1. Problems Concerning Mulberry Leaves

The second set of problem relates to mulberry leaves. Mulberry leaves are the main food plant of silkworms. During the rearing period, silkworm requires adequate mulberry leaves. The proper and adequate feeding has a predominant influence on the growth of silkworm and quality of cocoons. Therefore, the rearers prefer their own mulberry plants or they manage these plants from the surrounding and from the chawkie rearing centres free of cost. The poor farmers who take to silkworm rearing to supplement their income do not have own land to plant mulberry trees. They depend on big land owners mulberry trees who exploit them by charging heavy price for leaves. At the time of fodder scarcity, they do not supply the leaves with the result that the silkworm remains underfed and do not give as much yield of cocoons as they can. So, the main problem reported regarding mulberry leaves are their non- availability at the chawkie rearing centres. Otherwise also in some of the cases these centres are too far from rearers houses and there is non-availability of mulberry leaves in the surroundings.

7.2. Problems Concerning Mulberry Leaves

Thirty three (22%) of the rearers reported, non availability of mulberry leaves in surroundings as the major problem in sericulture activity. Another 30rearers (20%) reported unavailability of mulberry leaves in chawkie rearing centre as the main problem, which makes this activity difficult to sustain.

7.3. Problems in Silkworm Rearing

The third set of problems as explained by the sample group related to silkworm rearing. Mulberry silkworm is domesticated insect and has to be reared indoor. It requires great care and hard work by the rearers to preserve these worms. A suitable ventilated room is required for the silkworm rearing coupled with required proper appliances and rearing skills are must in this activity. The main problems related to silkworm rearing as reported by the selected sample rearers related to scarcity of silk seed, non-availability of rearing place and appliance and lack of timely visit of sericulture staff at the rearing place also increase the woes of

the rearers. The survey revealed that twenty three rearers (15.33%) consider non- availability of adequate seed as an important problem in silkworm rearing. Thirty five (23.33%) rearers reported non availability of proper place for rearing as the main hurdle in silkworm rearing. The rearers reported that in view of lack of proper, sufficient and hygienic environment coupled with lack of proper ventilation facilities in rearing places, silkworms are prone to number of diseases. Further, 43 (28.67%) rearers consider shortage of appliances required for silkworm rearing as the major problem. Sixty five (43.33%) of the sample rearers consider lack of timely visit of sericulture staff as a major factor aggravating the miseries of silkworm rearers. It was reported that sericulture officers do not make regular and timely visits of rearing centres to provide required technical advice to the rearers.

Problems Related to Climatic Hazard, Diseases and Attack of Ants and Rats etc. The fourth set of problems relates to climatic issues and is also concerned with insects etc. Silkworm rearing is a biological industry dealing with living matter. Silkworms are very delicate and are easily affected by the surrounding environment /diseases and attack. The growth of silkworms is influenced by the environmental conditions especially temperature and humidity. Fluctuations in the temperature cause diseases in silkworm. For instance, if there is a continuous rainfall for a week, silkworm diseases are likely to occur. Similarly, if there is hailstorm and temperature goes down considerably, again there are chance that silkworm will perish. Further, rats and ants also cause threat to the life of silkworm. In fact, there is one common problem of the rearers that, they do not have proper pakka houses and therefore, rearing room is also not well protected from insects. In the Himalayan region, grasserie and flacherie are the main diseases in the silkworm. A large number of rearers 56 (37.33%) reported that silkworm usually get infected by grassrie and flacherie diseases due to climatic factor. Further, 65 (43.33%) of sample rearers reported, attack of ants and rats etc. as one of the main problems relating to sericulture.

7.4. Problems in Context to Marketing

Smooth and timely marketing of cocoons is indispensible for the growth of sericulture. In the absence of required marketing mechanism, the rearers do not realise fair price of their product. The entire cocoon produced is purchased entire by the government and private silk reeling units in the state. However, silk reeling units give very low price of cocoons to the producers and this is one of the major problems of sericulture. The marketing problems faced by the rearers include low cocoon price, delay involved in selling of cocoon at the right time and far flung markets of cocoons. Hundred (66.67%) reported that usual delay involved in collection of cocoons by the government agencies is the major marketing problem they face. The cocoons tend to perish if not supplied/ purchased in time by the concerned agencies. Further, silk reeling units also do not offer fair price of their cocoons. All the rearers reported this as a major marketing problem.

7.5. Problem Relating to Training

Silkworm rearing requires technical guidance and in the absence of training and guidance, the rearers are not able to carry out the sericulture activities properly and efficiently, which result into the poor production of cocoons. Most of the rearers are untrained and lack required skill to take up various sericulture activities. They have only been taught to rear worms in their houses under the supervision of sericulture officers who are supposed to visit their premises during rearing period. The response of the sample rearers relating to training is shown. Seventy Five (50%) rearers reported that they do not have any required training in mulberry cultivation. Further, 77 (51.33%) rearers said because of lack of required training in silkworm rearing, they face number of problems in sericulture.

7.6. Problems Concerning Credit Facilities

Most of the rearers in district Kangra are small and marginal farmers with limited financial resources. They require adequate capital to carry various sericulture activities. Mobilisation of finances is the major problem which sericulturists face. The sericulture department does not provide these sufficient financial assistance or subsidy for carrying sericulture activities. Further, sericulture department does not provide proper insurance of silkworm also. This is one of the important reasons why sericulture activities have not fully developed in the state and people do not come forward to carry on this activity at a large scale. All the150 sampled rearers reported non- availability of sufficient credit by the department concerned or by other institutions as the major problem in sericulture industry. Thus, all the rearers assigned more than one problem which they face in sericulture activities.

8. Problems Relating to Sericulture Department

8.1. Problems in Technical Guidance

There are seven major sericulture divisions in the state i.e. at Mandi, Sirmour, Palampur, Nadaun, Bilaspur, Una and Shimla. The posts of technical officers in these divisions are lying vacant and these posts are not filled by the department for long. Because of lack of qualified field staff, there is no proper quality technical guidance provided to the rearers. There is very poor coordination between mulberry growers and concerned government agencies. Flow of technical guidance and know- how are practically missing from government agencies to the rearers. The rearing supervision work is left to the un-trained and un-qualified staff who cannot be expected to do full justice to their duty unless technical guidance is offered to them and occasional checks are made of rearing centres, especially at odd hours, during the rearing seasons, when temperature and humidity needs to be controlled. Their fluctuation during incubation and chawkie rearing stage has a disastrous effect on the silkworm at the ripening stage.

8.2. Lack of Transport Facility and Mobility of Staff

Sericulture department has to transport living material viz., mulberry plants from nurseries to rearers and seed cocoons from the seed rearers to the seed production units. Transport of cocoons or plants on bus is harmful to these biological products and this

unscientific method of transport results in heavy mortality of these products. Moreover, since the rearers houses have to be visited by the checking staff and in view of virtually arrangement of their stay, checking staff is looking for the excuses of not visiting their silk rearing centres. Otherwise also since almost all the rearing centres have to be by and large during the same period and require official vehicle are not easily available. Hence, there is poor supervision by the staff.

8.3. Lack of Technical Data for Future Guidance

For a proper appreciation of the requirement of silk seed of individual rearers and of the area looked after by each in charge of centre, proper record of mulberry with the farmer concerned as well as in the village concerned needs to be maintained so that it could be known in advance that how much is the rearing capacity of a village. Usually staffs do not maintain any such data. Even the record of distribution of plants is not readily available with them

9. Suggestions

The study reveals that sericulture industry study that sericulture industry faces certain inherent problems. Sericulture has suffered from various problems because of declining interest of people in it and increasing competition with other states. This is attributed to the poor quality of locally produced silk seed, primitive methods of rearing, failure on the part of sericulture department to educate the people of the improved methods, the poor quality of mulberry leaf and low price of cocoon etc.

- The successful establishment of sericulture requires integrated programme of development to identify the basic problem, the process of sericulture activities and strengthening the base of development. Farmers should be directed to raise the improved mulberry species under rain fed conditions.
- Marketing is the weaker section of sericulture in the state. So, it is suggested that pooper marketing system i.e. fair price of cocoon, timely collection of cocoons etc. should be introduced which provide maximum benefits to the rearers. This may also help in motivating the other farmers to take up sericulture as an additional occupation.
- Other important pre-requite for the growth of sericulture in the state is that the rearers should provide long terms as well as short term loans for mulberry plantation, construction of rearing room and for rearing equipments. The sericulture department should provide insurance of silkworm to the rearers.
- The state governments has to play an important role to develop the proper infrastructure for improved silk seed production by setting up more chowkie rearing centres in important places and develop sericulture activities in the state.
- For the development of sericulture, effective training of silkworm rearing and mulberry plantation should be given to the rearers, which may increase the quality of silk cocoon and mulberry plantation.
- The government must have a concrete policy towards sericulture industry. Highly financial allocation should be made on the development of this sector. It is the overall responsibility of the government to remove various obstructions in the development of sericulture in the state.

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