

*Full Length Research Paper*

# **An investigation of the sericulture and extension status in Iran**

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The overall aim of this study was to investigate the sericulture and extension situation for revitalizing silkworm cocoon production in Iran. To achieve this aim, 316 sericulturists were selected through stratified random sampling and 58 extension agents of Iran Silkworm Rearing Corporation were studied by census. To run the appropriate analyses, SPSS software was employed. This study was descriptive and quantitative research. The results showed that rate of presented training to sericulturists and extension agents have got the first rank in hatching stage. The rate of presented training to sericulturists and extension agents for processing cocoon to silk products was the last in the courses. Training courses to meet the educational needs should be provided to sericulturists by Iran Silkworm Rearing Corporation and also sericulturists tended to take part in training programs. The most important problem for the sericulturists at the time of sericulture was silkworm diseases or pests. Extension should encourage sericulturists to use their mulberry garden for their other products in a year. Sericulturists believe that increasing extension agents' abilities through training and preparing the ground to establish cooperatives with a complete output cycle for revitalizing silkworm cocoon production are the most important things and ranked first. Regarding the view of extension agents, establishing the sericulture organization for revitalizing silkworm cocoon production was in the first rank. Extension agents should use methods of group discussion and result demonstration in sericulturists training. Also sericulturists are doing the silkworm rearing with the help of family members, so teaching all family members should be seriously considered which requires increasing the number of extension agents.

**Key words:** Sericulture, extension, revitalization, Iran.

## **INTRODUCTION**

The reduction of rural poverty continues to be a paramount goal of the developing countries like Iran. Creating rural industries such as sericulture can effectively reduce poverty and bring about rural development (Ntaanu, 2008).

Iran has the capacity to increase cocoon production and silk fibers due to availability of cheap and abundance

work force, mulberry trees, experience and acquaintance of sericulturists with this profession and carpet-weaving workshops (Pourhossein, 2003).

Sericulture in Iran has begun from the Sassanid Ages and reached to its peak in the Safavid Ages (Moradianfar, 2000). In Safavid ages, the country raw silk production has reached to 3000 tons in year and Iran was third world silk producer. After Islamic Revolution in 1978, Iran Silkworm Rearing Corporation has begun its activity in 1980 (Seidavi and Bizhannia, 2006). Silkworm Rearing Corporation practices as an attendant of sericulture

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industry in Iran (Iran Silkworm Rearing Corporation, 2007). Iran Silkworm Research Center in 2005 has been set up by separation of Silkworm Rearing Corporation. The main task of Iran Silkworm Research Center is to attempt to improve of sericulture efficiency by research (Iran Silkworm Research Center, 2009). The industrial section of silk production which is mainly invested by the private sector which includes thread production factories and 1300 traditional workshops of manual silk production, turning cocoon into silk and thread (Iran Silkworm Rearing Corporation, 2009). The Study Fund of Sericultural Development and Silk Industries were established in 1988. The final goal of the fund was increase in silk production from 500 to 3000 tons in years.

According to statistics of Iran Silkworm Rearing Corporation, production of cocoon had been more than 5000 tons in 1980s (Iran Silkworm Rearing Corporation, 2007) and 730 tons in 2009 (Pourhossein, 2009a), so production of cocoon has decreased to lower than one sixth. Also number of rearers has decreased from 80000 in 1995 (Moradianfar, 2000) to 25389 in 2007 (Iran Silkworm Rearing Corporation, 2007). The extent of Iran mulberry fields have decreased from 17000 ha in 1995 (Moradianfar, 2000) to 11305 ha in 2007 (Iran Silkworm Rearing Corporation, 2007). The demand for rearing silkworm during recent years has had a significant reduction and reached to about 27 thousand silkworm egg boxes in 2009 (Pourhossein, 2009b).

The silkworm rearers in Iran still follow the hold cultivation method with age old and low yielding mulberry varieties. They also continue to practice the primitive rearing method. Further, they are not aware of the prophylactic measures to prevent and control mulberry and silkworm diseases (Pourhossein, 2003). Sericulture extension is the only way to overcome the bottleneck between lab and land.

Extension may be defined as the science of developing capability of the people for sustainable improvement in their quality of life (Singh et al., 2009). Extension is no longer simply focused on improving yields. Large numbers of subsistence farmers have to break out of not just financial but also information poverty, skill and competency poverty and cultural poverty. Extension is not only about to bring change in unfavorable present situation to stakeholders, but also to preventing problem creation for the sake of the prosperous generation as well (Malakmohammadi, 2009). Sericulture is agro based and labor oriented industry, therefore sericulture extension is aimed to generate interest of individual farmer and the farming community as a whole (Singh et al., 2009).

The overall aim of this study was to investigate the sericulture and extension situation for revitalizing silkworm cocoon production in Iran. For this aim, cocoon production rate, the important factors for revitalizing silkworm cocoon production in Iranian sericulturists and

extension agents' view were identified. Also, personal and professional characteristics of sericulturists and extension agents, educational status of sericulturists and extension agents, the most important factors in adopting sericulture technologies and appropriate methods for training sericulturists and extension agents were also studied.

## MATERIALS AND METHODS

Research methodology applied in this study was descriptive and quantitative methods. Ranking has been done through coefficient of variation. The ratio of standard deviation to mean was coefficient of variation. The statistical population included sericulturists and extension agents of Iran Silkworm Rearing Corporation which extension agents were studied through census and sericulturists were selected through stratified random sampling method. As sample of 58 extension agents and 316 sericulturists were taken randomly. Sericulturists' questionnaire included cocoon production rate, participation times in training courses, the rate of training courses presentation, effective factors in adopting new technologies, important factors for revitalizing silkworm cocoon production, the appropriate training methods, sericulturists' problems at the time of silkworm rearing, sericulturists' technical and personal characteristics. Extension agents' questionnaire included the rate of training presented, important factors for revitalizing silkworm cocoon production, extension agents' abilities, suitable training methods to promote extension agents' awareness and their personal and professional characteristics.

The content validity of questionnaires were measured by a group of extension specialists. In order to investigate the reliability of research questionnaire, 30 sericulturists were randomly selected and they completed the questionnaire. Also 30 questionnaires were given to the extension agents of the Iran Silkworm Rearing Corporation and were completed. Cronbach's alpha and ordinal theta for the sericulturists' questionnaires were 0.89 and 0.91 respectively. Also Cronbach's alpha and ordinal theta for the extension agents' questionnaires were 0.90 and 0.92 respectively. Data collected was analyzed using the Statistical Package for the Social Sciences (SPSS).

## RESULTS

The study results showed that the mean of sericulturists' age and their sericulture experiences were respectively 52.63 and 26.19 years. 61.6% of sericulturists were illiterate and 82.3% of them performed silkworm rearing by helping of their wives and children. 70.8% of sericulturists have performed hatching individually. Silkworm nursery situation of 83.7% of sericulturists were traditional. All sericulturists in the study have engaged in silkworm rearing just one time in a year. 50.5% of sericulturists use their mulberry gardens for other crops in the year, and 93.1% do not change their cocoon to silk productions. The mean reduction in cocoon production by sericulturists has been 154.72 kg during the last three years.

On mean, sericulturists have contacted at least five times during the year with different branches of the Iran

**Table 1.** Sericulture training courses ranking presented to silkworm rearers.

Stage	n <sup>1</sup>	M <sup>2</sup>	SD <sup>3</sup>	C.V <sup>4</sup>	R <sup>5</sup>
Hatching	302	4.14	0.94	23	1
Planting mulberry trees	291	3.93	1.03	26	2
Young worms	272	3.86	1.22	32	3
Mulberry trees maintenance	248	3.57	1.22	34	4
Harvesting mulberry leaves	237	3.54	1.32	37	5
Mature worms	249	3.49	1.32	38	6
Harvesting cocoon	287	3.23	1.41	43	7
Silkworm diseases and pests	314	3.06	1.43	47	8
Processing cocoon to silk products	122	2	1.48	74	9

1- Number; 2- mean; 3- standard deviation; 4- coefficient of variation; 5- rank; Likert scale: very Low (1), low (2), medium (3), much (4), very much (5).

**Table 2.** Presenting new sericulture technologies ranking to silkworm rearers.

Stage	n <sup>1</sup>	M <sup>2</sup>	SD <sup>3</sup>	C.V <sup>4</sup>	R <sup>5</sup>
Mulberry garden	286	3.26	1.53	47	1
Silkworm rearing	284	3.30	1.58	48	2
Silkworm nursery	258	3.39	1.6	48	2
Silk spinning	226	1.73	1.42	60	3
Silk weaving	159	1.29	0.82	64	4

1- Number; 2- mean; 3- standard deviation; 4- coefficient of variation; 5- rank; Likert scale: very Low (1), low (2), medium (3), much (4), very much (5).

**Table 3.** Ranking the most important factors in adopting the new sericulture technologies by silkworm rearers.

Factor	n <sup>1</sup>	M <sup>2</sup>	SD <sup>3</sup>	C.V <sup>4</sup>	R <sup>5</sup>
Cost	315	4.24	1.15	27	1
Necessary machines	295	3.83	1.34	35	2
Training	314	3.93	1.4	36	3
Acquaintance	274	3.86	1.43	37	4
Insurance	303	3.68	1.45	40	5
Staffs skill	312	3.36	1.45	43	6

1- Number; 2- Mean; 3- standard deviation; 4- coefficient of variation; 5- rank; Likert scale: very Low (1), low (2), medium (3), much (4), very much (5).

Silkworm Rearing Corporation. The mean times in which sericulturists took part in the training courses were four during the year. Also, 81% of sericulturists had stated that training courses were useful and 90% tended to take part in training programs. According to Table 1, the rate of training presented to sericulturists for hatching ranked the first and training for processing cocoon to silk products was the last in the courses.

Based on Table 2, the presenting rate on the new technologies about mulberry garden had the first rank and providing new technologies in silk weaving was the

last. Therefore it is necessary to increase sericulturists' income in silk spinning and silk weaving by presenting more technologies. Based on the information in Table 3, the cost was most important factor in adopting new sericulture technologies by sericulturists.

Table 4 shows that the most appropriate methods for sericulturists' training were discussion group and result demonstration. Method demonstration had the last ranking. Based on the data in Table 5, the most important problem for the sericulturists at the time of sericulture was silkworm diseases or pests. Lack of rearing space

**Table 4.** Ranking sericulturists' training methods.

Training method	n <sup>1</sup>	M <sup>2</sup>	SD <sup>3</sup>	C.V <sup>4</sup>	R <sup>5</sup>
Discussion group	303	4.22	1.26	30	1
Result demonstration	299	3.95	1.19	30	1
Workshop	288	3.81	1.24	33	2
Progressive sericulturists	296	3.72	1.22	33	2
Training at mulberry garden	299	3.88	1.28	33	2
Posters and periodical publication	285	3.61	1.39	39	3
Educational films	288	3.18	1.36	43	4
Method demonstration	304	3.03	1.35	45	5

1- Number; 2- mean; 3- standard deviation; 4- coefficient of variation; 5- rank; Likert scale: very Low (1), low (2), medium (3), much (4), very much (5).

**Table 5.** Ranking the sericulturists' problems during silkworm rearing.

Problem	n <sup>1</sup>	M <sup>2</sup>	SD <sup>3</sup>	C.V <sup>4</sup>	R <sup>5</sup>
Silkworm diseases or pests	302	4.1	1.17	28	1
Inappropriate larvae rearing	250	3.77	1.25	33	2
Mulberry tree pests or diseases	284	3.65	1.22	34	3
Inappropriate silkworm eggs hatching	291	3.7	1.27	34	3
Lack of rearing space and density	296	3.16	1.39	44	4
Inappropriate rearing place	305	2.97	1.31	44	4

1- Number; 2- mean; 3- standard deviation; 4- coefficient of variation; 5- rank; Likert scale: very low (1), low (2), medium (3), much (4), very much (5).

**Table 6.** Ranking major factors in revitalizing silkworm cocoon production based on the sericulturists' comments.

Factor	n <sup>1</sup>	M <sup>2</sup>	SD <sup>3</sup>	C.V <sup>4</sup>	R <sup>5</sup>
Increasing extension agents' abilities through training	290	4.11	1.11	27	1
Preparing the ground to establish cooperatives with a complete output cycle	298	4.02	1.09	27	1
Integrated Operations of Sericulture + agriculture + livestock	297	4.05	1.17	29	2
Increasing technical knowledge of sericulturists	279	4.12	1.28	31	3
Sericulturists' insurance	290	3.82	1.22	32	4
Increasing private sector participation in cocoon production, silk weaving and silk spinning	315	3.76	1.28	34	5
Using the most appropriate channels and training methods	288	3.57	1.22	34	5
Educating sericulturists about the modern sericulture by experts	296	3.39	1.38	41	6
Free distribution of mulberry seedlings among villagers	301	3.33	1.48	44	7

1- Number; 2- mean; 3- standard deviation; 4- coefficient of variation; 5- rank; Likert scale: very low (1), low (2), medium (3), much (4), very much (5).

and density and inappropriate silkworm place were the last problems in the list.

Based on Table 6, the sericulturists believe that increasing extension agents' abilities through training and preparing the ground to establish cooperatives with a complete output cycle for revitalizing silkworm cocoon production are the most important things and ranked first. Free distribution of mulberry trees among villagers

ranked the last among the most important factors to rehabilitate silk cocoon production.

The mean age of sericulture extension agents was 55.43 years. Also, 90.6% of extension agents were male and 9.4% were women. The mean work experience as extension agent was 14.41 years. Also, 34.5% of extension agents majored in Animal Sciences and 18.2 % in sericulture and only 1 person (1.8%) had a college

**Table 7.** Sericulture training courses ranking presented to extension agents.

Stage	n <sup>1</sup>	M <sup>2</sup>	SD <sup>3</sup>	C.V <sup>4</sup>	R <sup>5</sup>
Hatching	58	4.35	0.96	22	1
Silkworm diseases and pests	56	4.25	1.1	26	2
Planting mulberry trees	57	4.25	1.13	27	3
Harvesting mulberry leaves	57	4.1	1.15	28	4
Harvesting cocoon	58	4.02	1.32	33	5
Mulberry trees maintenance	58	3.96	1.32	33	5
Mature worms	58	3.89	1.34	35	6
Young worms	57	3.83	1.53	40	7
Processing cocoon to silk products	42	2.43	1.39	57	8

1- Number; 2- mean; 3- standard deviation; 4- coefficient of variation; 5- rank; Likert scale: very Low (1), low (2), medium (3), much (4), very much (5).

**Table 7.** Sericulture training courses ranking presented to extension agents.

Stage	n <sup>1</sup>	M <sup>2</sup>	SD <sup>3</sup>	C.V <sup>4</sup>	R <sup>5</sup>
Hatching	58	4.35	0.96	22	1
Silkworm diseases and pests	56	4.25	1.1	26	2
Planting mulberry trees	57	4.25	1.13	27	3
Harvesting mulberry leaves	57	4.1	1.15	28	4
Harvesting cocoon	58	4.02	1.32	33	5
Mulberry trees maintenance	58	3.96	1.32	33	5
Mature worms	58	3.89	1.34	35	6
Young worms	57	3.83	1.53	40	7
Processing cocoon to silk products	42	2.43	1.39	57	8

1- Number; 2- mean; 3- standard deviation; 4- coefficient of variation; 5- rank; Likert scale: very Low (1), low (2), medium (3), much (4), very much (5).

**Table 8.** Ranking the ability of sericulture extension agents.

Ability	n <sup>1</sup>	M <sup>2</sup>	SD <sup>3</sup>	C.V <sup>4</sup>	R <sup>5</sup>
Preparing the posters and periodical publications	58	4.26	0.99	23	1
Knowing the indigenous knowledge of the sericulturists	58	4.15	1.08	26	2
Having the ability in planning, designing and implementing the program	57	4.06	1.11	27	3
Using projector and overhead	58	4.24	1.27	30	4
Educational evaluation ability	57	3.81	1.27	33	5
Understanding various problems of sericulturists	58	3.84	1.36	35	6
Being familiar with sericulturists' culture	58	3.83	1.38	36	7
Ability to attract sericulturists' confidence	57	3.8	1.46	38	8
Ability to attract participation	57	3.77	1.48	39	9
Awareness of sericulturists' psychology	58	3.64	1.47	40	10

1- Number; 2- mean; 3- standard deviation; 4- coefficient of variation; 5- rank; Likert scale: very Low (1), low (2), medium (3), much (4), very much (5).

education in the field of extension. According to Table 7, the rate of training presented to extension agents in hatching had the first rank and in processing the cocoon into silk products were the last.

Based on Table 8, the ability of sericulture extension agents in preparing posters and periodical publications was ranked first and the ability of extension agents in awareness of sericulturists' psychology was the last.

**Table 9.** Ranking the appropriate training methods to increase awareness of sericulture extension agents.

Method	n <sup>1</sup>	M <sup>2</sup>	SD <sup>3</sup>	C.V <sup>4</sup>	R <sup>5</sup>
Participating in comparative- research projects	54	4.33	1.05	24	1
Using the world wide web (the internet)	58	4.3	1.05	24	1
Reading extension and training magazine	58	4.23	1.1	26	2
Using radio and television programs	55	4.12	1.23	30	3
Participation in extension conferences and seminars	55	4	1.24	31	4
Participating in extension-research projects	56	3.96	1.28	32	5
Visiting the extension activities	58	3.93	1.36	35	6

1- Number; 2- mean; 3- standard deviation; 4- coefficient of variation; 5- rank; Likert scale: very Low (1), low (2), medium (3), much (4), very much (5).

**Table 10.** Ranking the most important factors for revitalizing silkworm cocoon production from the view of sericulture extension agents.

Factor	n <sup>1</sup>	M <sup>2</sup>	SD <sup>3</sup>	C.V <sup>4</sup>	R <sup>5</sup>
Establishing sericulture organization	58	4.35	1.01	23	1
Sericulture insurance	54	4.21	1.15	27	2
Sericulturists training	58	4.17	1.17	28	3
Increasing private sector participation in cocoon production, silk spinning and silk weaving	57	4.2	1.18	28	3
Free distribution of mulberry seedlings among villagers	56	4	1.3	32	4
Developing integrated operations of sericulture + agriculture + livestock	56	4.1	1.34	33	5
Removing intermediaries and brokers from silk and cocoon market	58	3.96	1.35	34	6
Developing sericulture courses for the improvement of sericulture science	58	3.96	1.4	35	7
Increasing experts' extension abilities through training	58	3.85	1.39	36	8
Government support such as cocoon guaranteed purchase	53	3.74	1.4	38	9

1- Number; 2- mean; 3- standard deviation; 4- coefficient of variation; 5- rank; Likert scale: very Low (1), low (2), medium (3), much (4), very much (5).

According to the findings in Table 9, from the perspective of sericulture extension agents, participating in comparative- research projects and using the world wide web (the internet) had the first rank for increasing awareness extension agents. Also visiting the extension activities for increasing awareness extension agents was the last. Also, According to Table 10, the extension agents believe that establishing sericulture organization for revitalizing silkworm cocoon production had the first rank and the government support of sericulture like cocoon guaranteed purchase had the last in the given ranking for revitalizing silkworm cocoon production in Iran.

## DISCUSSION

The results showed that the mean sericulturists' age was 52.36 which indicate the fact that Iran sericulture society is old. Also, 61.6% of the sericulturists were illiterate. Extension agents should use methods of group

discussion and result demonstration in sericulturists training. Chatterjee (2007) observed that sericulturists always prefer interaction.

Considering the point that 82.3% of sericulturists do the silkworm rearing with their family members' help, accordingly all family members training should be seriously considered as one of the importance principles in sericulture (Singh et al., 2009; Kumaresan and Srinivasa, 2005). The mean times in which sericulturists took part in the training courses were four during the year. Also, 81% of sericulturists had stated that training courses were useful and 90% tended to take part in training programs. Research conducted by Charmchianlangerodi and Chizari (2005) also showed that about 90% of sericulturists would like to take part in training courses. So, training courses to meet the educational needs should be provided to sericulturists by Iran Silkworm Rearing Corporation. On mean, sericulturists have contacted at least five times during the year with different branches of the Iran Silkworm Rearing Corporation. According to sericulturists' contact with

different branches of Iran Silkworm Rearing Corporation, it is necessary that the extension department do its utmost to use this opportunity to inform and train sericulturists.

All sericulturists in the study have engaged in silkworm rearing just one time in a year. Also, 50.5% of sericulturists use their mulberry gardens for other crops in the year. So, 49.5% of sericulturists use their mulberry garden just for a month and did not use it for other crops in the year. However, five or six other products can be harvested in one year in a mulberry garden (Hosseinimoghaddam, 2005). As a result, sericulturists should be encouraged by the help extension department to use their mulberry farm for other products over the year.

The rate of training presented to sericulturists and extension agents for processing cocoon to silk products was the last in the courses. Sericulture provides two types of employment: one is direct which includes mulberry cultivation, silkworm rearing and cocoon production and the other is indirect industry which involves silk spinning and silk weaving. Scholarly literature portrays rural livelihoods diversification as a continuously occurring phenomenon that results from the increased importance of off-farm wage labor in the household livelihood portfolio or through the development of new forms of on-farm commodities (Simtowe, 2010). Therefore, extension department should take into account the indirect employment that sericulture creates for the added value.

The mean age of sericulture extension agents was 55.43 years. Also 90.6% of extension agents were male and 9.4% were women. Considering the point that 82.3% of sericulturists do the sericulture with their family members' help, accordingly all family members training should be seriously considered and it can be concluded that the number of extension agents (especially women) is not enough for training sericulturists and their family.

Sericulturists believed that increasing extension agents' abilities through training and preparing the ground to establish cooperatives with a complete output cycle for revitalizing silkworm cocoon production are the most important things and ranked first. Kasa (2005) emphasized on the trained personnel for revitalizing and developing sericulture. Also, research conducted by Kasa (2005) showed that extension support to foundation and organization of sericulture groups and formation of cooperatives with a complete output cycle (production of silkworm eggs, cocoon to silk transformation, production of silk yields and supply to market) that are on the way of costs reduction and income increase would eventually cause to economic profits.

Regarding the view of extension agents, establishing the sericulture organization for revitalizing silkworm cocoon production was in the first rank. Findings by

Gangopadhyay (2009) indicated that establishing sericulture organization to coordinate different parts from harvesting cocoon, silk spinning and silk weaving is necessary.

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