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Technological knowledge about sericulture among farming families

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Abstract
Sericulture is providing sustainable livelihood to many rural and semi-urban people in India. It is a farm-based, labour intensive and commercially attractive economic activity. The farm and non-farm activities of this enterprise create sixty lakh man days of employment every year in the rural sector. The southern part of Karnataka is known for its traditional sericulture since from many decades. However sericulture is slowly emerging as one of the most important agro-based economic activity for most of farmers because of minimum investment, low gestation period, high employment potential and high remunerative returns. Therefore a research study was conducted to know the gender differences in technological knowledge about sericulture production technologies among 300 sericulture farming families in Bagalakot, Belagavi and Haveri districts of north Karnataka during the year 2018-2019. The results revealed that a large majority of men (88.33%) and women (81.00) had high level of knowledge. Only 11.67 percent men and 19.00 percent women had medium knowledge. None of them were in the low category. There is a significant difference in knowledge between men and women regarding preparation of land (z- value 2.14*), pest and disease management (z- value 2.32*), silkworm varieties and room management (z-value 2.09*), silkworm management in mountages (1.90*) and rules & regulations of sericulture market (z- value 2.19*). However, there is no significant difference between knowledge level among men and women regarding water & fertilizer management, weed management & inter-cultivation, mulberry harvesting & storage, silkworm rearing & feed management in the shoot system and picking of cocoons & selling. There is a significant difference in knowledge level of men and women of the three districts (C.D. value 2.46). The men of Bagalkot district had the highest mean score of 65.26 followed by Haveri (60.47) and Belagavi (57.83). Similarly in case of women, the women of Bagalkot district had highest mean score of 61.63 followed by Belagavi (59.35) and Haveri (51.45). Hence, it can be concluded that there is a significant difference in knowledge of both men and women among the three districts in general, and men's knowledge was better than that of women indicating need to educate through various means to make them equal partners in sericulture production activities as sericulture is family affair.

Keywords: Sericulture, technological knowledge

Introduction
Livelihood generation is one of the major potentials of sericulture and silk industry. Sericulture has emerged as the most important cash crop with minimum investment, low gestation period, high employment potential and highly remunerative return. Sericulture involves simple technologies, which are easy to understand and to adopt. Sericulture has provided downstream employment and income generation in rural and semi-urban areas, high participation for low-income and socially under-privileged groups.

India is the second largest producer of mulberry silk, next to China, accounting more than 15 per cent of the global raw silk production. Mulberry sericulture is practiced in almost all states in the country but Karnataka, Andhra Pradesh, West Bengal and Tamil Nadu together account for about 98.20 per cent of the total mulberry silk production in country. Area under mulberry plantation in Karnataka is 98,135 hectares with mulberry raw silk production of 9322 MT which is accounts for 30 per cent of country's raw silk production.

Sericulture being a cottage industry and a family affair, most of the sericulture activities are indoor, it provides ample of work opportunities for both women and men in rural areas along with agriculture and allied activities. Silk worm being delicate has to be handled with care. Thus, the entire process needs skill and patience, which suits to women well. Its unique nature of work proves to be an ideal activity for farm households who can engage themselves in this activity in addition to their regular tasks. In this background the present study was know the Technological Knowledge of sericulture farm households.

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Material and methods
The study was conducted in Bagalakot, Belagavi and Haveri districts of North Karnataka state coming under the jurisdiction of UAS, Dharwad during 2018-19. Among the three districts, two taluks from each district and two villages from each taluka have been selected based on area under mulberry and sericulture farmers. Hence a total of 300 sericulture farming families (in each district 100 sericulture farming families) have been selected from 12 villages with 25 sericulture farming families from each village using simple random sampling technique. Therefore, 300 men and 300 women from all three districts constituted as the sample for the study. Correlation is used to know the relationship between socio-personal characteristics and Technological knowledge about sericulture production activities. Z-test was used to know the differences in knowledge in all the dimensions of sericulture. ANOVA technique is used to

compare the Technological knowledge level of farming familiesin different districts.

Results and Discussion
The knowledge level of men and women (Table 1) of sericulture families was calculated and categorized in to low, medium and high level of knowledge under different dimensions of mulberry cultivation and silkworm rearing activities. Results revealed that 72 per cent of the men and 56 per cent of the women belonged to high category and 27.67 per cent of men 41.67 of women had medium knowledge regarding preparation of land and plantation. Men and Women of Bagalakot districts took high category place (81% and 80%) (45.67% and 36.33%) respectively as compared to Belagavi (70% and 39%) and Haveri districts (66% and 48%) respectively.

Table 1: Categorization of Sericulture farming families based on their overall knowledge of mulberry cultivation n=600

Sl. No.	Dimensions of knowledge	Categories	Bagalakot (n1=200)		Belagavi (n2=200)		Haveri (n3=200)		Total (n=600)	
			Men (n=100)	Women (n=100)	Men (n=100)	Women (n=100)	Men (n=100)	Women (n=100)	Men (n=100)	Women (n=100)
			F (%)	F (%)	F (%)	F (%)	F (%)	F (%)	F (%)	F (%)
1	Preparation of land and Plantation	Low (Up to 3)				1 (1.00)		7 (7.00)		8 (2.67)
		Medium (4-6)	19 (19.00)	20 (20.00)	30 (30.00)	60 (60.00)	34 (34.00)	45 (45.00)	83 (27.67)	125 (41.67)
		High (7-9)	81 (81.00)	80 (80.00)	70 (70.00)	39 (39.00)	66 (66.00)	48 (48.00)	216 (72.00)	168 (56.00)
2	Water management and Fertilizer application	Low (Up to 2)	16 (16.00)	10 (10.00)	26 (26.00)	16 (16.00)	28 (28.00)	65 (65.00)	70 (23.33)	91 (30.33)
		Medium (2-4)	42 (42.00)	46 (46.00)	57 (57.00)	51 (51.00)	48 (48.00)	33 (33.00)	147 (49.00)	130 (43.33)
		High (4-5)	41 (41.00)	44 (44.00)	17 (17.00)	33 (33.00)	24 (24.00)	2 (2.00)	82 (27.33)	79 ((26.33)
3	Weed management and Inter cultivation	Low (Up to 1)	76 (76.00)	85 (85.00)	91 (91.00)	81 (81.00)	86 (86.00)	91 (91.00)	253 (84.33)	257 (85.67)
		Medium (1-2)	14 (14.00)	4 (4.00)	5 (5.00)	11 (11.00)	14 (14.00)	9 (9.00)	33 (11.00)	24 (8.00)
		High (2-3)	10 (10.00)	11 (11.00)	4 (4.00)	8 (8.00)	-	-	14 (4.67)	19 (6.33)
4	Pest and disease management	Low (Up to 4)	-		2 (2.00)	-	3 (3.00)	44 (44.00)	5 (1.67)	44 (14.67)
		Medium (5-9)	12 (12.00)	43 (43.00)	63 (63.00)	42 (42.00)	39 (39.00)	26 (26.00)	114 (38.00)	111 (37.00)
		High (10-14)	88 (88.00)	57 (57.00)	35 (35.00)	58 (58.00)	58 (58.00)	30 (30.00)	181 (60.33)	145 (48.33)
5	Mulberry harvesting and storage	Low (Up to 2)	2 (2.00)	3 (3.00)	43 (43.00)	5 (5.00)	19 (19.00)	45 (45.00)	64 (21.33)	53 (17.66)
		Medium (3-4)	35 (35.00)	48 (48.00)	29 (29.00)	56 (56.00)	35 (35.00)	17 (17.00)	99 (33.00)	121 (40.33)
		High (5-6)	63 (63.00)	49 (49.00)	28 (28.00)	40 (40.00)	46 (46.00)	38 (38.00)	137 (45.67)	127 (42.33)

In case of water management and fertilizer application 49.00 per cent of men 43.33 per cent of women were found in medium category followed by high (27.33% and 26.33%) and low categories (23.33% and 30.33%) respectively.
With respect to weed management and inter-cultivation, in all the three districts majority of men and women belonged to low category (84.33% and 85.67%) respectively. Among all men, the knowledge range was between 5 to 14 per cent. Whereas, in case of women the was ranging between 4 to 11 percent. The most probable reason expressed by the respondents is that, silk worms will die after consuming the weedicide sprayed mulberry leaves.

The knowledge level about pest and disease management in mulberry cultivation indicates that both men and women belonged to high (60.33 and 48.33%) and medium (38% and 37%) category respectively. A great majority of men (88%) of Bagalakot district found in high category of knowledge with respect to pest and disease management
The knowledge level category on mulberry harvesting and storage shows that almost an equal percentage of men and women spread in high (45.67% and 42.33%) and medium (33% and 40.33%) category respectively
Overall technological knowledge about silkworm rearing (Table 2) indicates greater percent of men and women were found in high to medium knowledge category in all aspects

such as silkworm varieties and room management (68% and 31.67%), feeding management in shoot system (86.33% and 13.67%), silkworm management in mounatages (59% and 40%) and picking of cocoons and selling (77.67% and 13.67%) respectively. In other aspects *i.e.* pest and disease management (57% and 42.33%) and rules & regulations of cocoon marketing (45.67% and 36.33%) respectively for men and women were found in medium to high categories.

Table 2: Categorization of Sericulture farming families based on their overall knowledge of silkworm rearing n=600

Sl. No.	Dimensions of knowledge	Categories	Bagalakot (n1=200)		Belagavi (n2=200)		Haveri (n3=200)		Total (n=600)	
			Men (n=100) F (%)	Women (n=100) F (%)	Men (n=100) F (%)	Women (n=100) F (%)	Men (n=100) F (%)	Women (n=100) F (%)	Men (n=100) F (%)	Women (n=100) F (%)
1	Silkworm varieties and room management	Low (Up to 1)	-	-			-	-	-	
		Medium (2-3)	-	-	25 (25.00)	31 (31.00)	9 (9.00)	71 (71.00)	34 (11.00)	102 (34.00)
		High (3-4)	100 (100.00)	100 (100.00)	75 (75.00)	69 (69.00)	91 (91.00)	29 (29.00)	266 (88.67)	198 (66.00)
2	Silkworm rearing and feed management in the shoot system	Low (Up to 3)	-	-	-	-	-	-	-	-
		Medium (4-7)	-	3 (3.00)	-	27 (27.00)	4 (4.00)	11 (11.00)	4 (1.33)	41 (13.67)
		High (7-10)	100 (100.00)	97 (97.00)	100 (100.00)	73 (73.00)	96 (96.00)	89 (89.00)	296 (98.67)	259 (86.33)
3	Pest and Disease management	Low (Up to 3)	-	-	1 (1.00)	3 (3.00)	-	-	1 (0.33)	3 (1.00)
		Medium (4-6)	24 (24.00)	42 (42.00)	60 (60.00)	49 (49.00)	51 (51.00)	64 (64.00)	135 (45.00)	155 (51.67)
		High (7-9)	76 (76.00)	58 (58.00)	39 (39.00)	48 (48.00)	49 (49.00)	36	164 (54.67)	142 (47.33)
4	Silkworms management in Chandrike	Low (Up to 3)	-	1 (1.00)	3 (3.00)	2 (2.00)	-	-	3 (1.00)	3 (1.00)
		Medium (4-6)	20 (20.00)	36 (36.00)	60 (60.00)	38 (38.00)	25 (25.00)	46 (46.00)	105 (35.00)	120 (40.00)
		High (7-9)	80 (80.00)	63 (63.00)	37 (37.00)	60 (60.00)	75 (75.00)	54 (54.00)	192 (64.00)	177 (59.00)
5	Picking of cocoons and selling	Low (Up to 2)	-	-		26 (26.00)	-	-	-	26 (8.67)
		Medium (3-4)	6 (6.00)	11 (11.00)	13 (13.00)	11 (11.00)	7 (7.00)	19 (19.00)	26 (8.67)	41 (13.67)
		High (5-6)	94 (94.00)	89 (89.00)	87 (87.00)	63 (63.00)	93 (93.00)	81 (81.00)	274 (91.33)	233 (77.67)
6	Rules and Regulations of Market	Low (UP to 1)	-	1 (1.00)	54 (54.00)	1 (1.00)	-	-	54 (18.00)	2 (0.67)
		Medium (1-2)	42 (42.00)	50 (50.00)	35 (35.00)	50 (50.00)	32 (32.00)	71 (71.00)	109 (36.33)	171 (57.00)
		High (2-3)	58 (58.00)	49 (49.00)	11 (11.00)	49 (49.00)	68 (68.00)	29 (29.00)	137 (45.67)	127 (42.33)

Men occupies high category with respect to all dimensions such as silkworm varieties and room management (86.67%), silkworm rearing and feed management (98.67%), pest and disease management (54.67%), silkworm management in mounatges (64%), picking of cocoons and selling (91.33%) and rules and regulations of market(45.67%). However cent per cent men and women of Bagalakot district belonged to high knowledge category about silkworm varieties and room management as compared to Haveri (91% and 29%) and Belagavi district (75% and 69%) respectively. With regard to silkworm rearing and feed management in shoot system, cent per cent of men from Bagalakot and Belagavi districts and women of Bagalakot district were found in high knowledge category as against other district namely Haveri (96% and 89%) respectively and Belagavi with 73 per cent. More number of men and women from Bagalakot district occupies high category as compared to other two districts.

Results presented in table 3 indicated majority of the men (88.33%) and women (81%) belonged to high technological knowledge category. Only 11.67 per cent and 19 per cent of men and women were found in medium level of knowledge category. None of the respondents belonged to low knowledge level category.

The reasons for these results could be inferred because of more participation of men in sericulture production activities than women. Men had high consultancy with source of information, involved more in organizational activities, attained more number of training programmes on sericulture and high exposure to social media. There is less involvement of women respondents in these activities.

More number of men and women of Bagalakot district occupies high category as compared to other two districts. In Bagalkot most of the farmers have recently stared compared other two districts and practicing new methods of silkworm rearing Most of them are innovators. In Haveri district practicing of traditional methods was observed and they are not aware much about new technologies. Women involvement is found to be high in Bagalakot district as compared to Haveri and Belagavi. Women from Bagalakot district undergone more number of training programmes, had high mass media exposure and participated actively in

organisations through which they might have exposed to various information on sericulture enterprises.

Table 3: Categorization of respondents based on their overall knowledge mulberry cultivation and silkworm rearing n=600

Sl. No.	Categories	Men (n1=300) F (%)	Women (n2=300) F (%)
1	Low (0-26)	-	-
2	Medium (26-52)	35 (11.67)	57 (19.00)
3	High (52-78)	265 (88.33)	243 (81.00)

Table 4 shows the relationship between socio-economic characteristics and knowledge of men and women of sericulture farming families. The education, experience, annual income, organizational participation, extension participation, sources of information and mass media participation were found to be positive and highly significant with men's knowledge of sericulture farming families at 1 per cent probability, while the other variables like age and land holdings are non-significant and negatively related with knowledge level of men. Women's education, experience, size of the family and source of information were positively significant with knowledge at 1 per cent level of probability. Whereas, age, annual income and mass media participation were negatively significant at 1 per cent probability. Extension participation was positively non-significant and land holding was negatively non-significant with knowledge of women.

Table 4: Relationship between socio-economic characteristics and technological knowledge of sericulture farming families n=600

Sl. No.	Independent Variables	Bagalakot (n1=200)		Belagavi (n2=200)		Haveri (n3=200)		Total (600)	
		Men (n=100)	Women (n=100)	Men (n=100)	Women (n=100)	Men (n=100)	Women (n=100)	Men (n=100)	Women (n=100)
1	Age	0.009	-0.102	-0.179	-0.132	-0.013	-0.224**	-0.028	-0.169**
2	Education	0.229*	0.059	0.249*	0.210*	0.102	0.035	0.209**	0.248**
3	Experience	0.047	0.093	0.089	0.145	0.260**	0.259**	0.190**	0.337**
4	Size of family	-0.163	0.215*	-0.167	-0.087	0.268**	-0.149	0.053	0.438**
5	Land holding	-0.049	-0.101	-0.111	-0.185	0.049	0.034	-0.029	-0.041
6	Annual income	0.193	0.242*	0.301**	-0.142	0.085	0.010	0.216**	-0.275**
7	Organisational Participation	0.019	0.035	0.098	0.013	0.036	0.213*	0.164**	0.037
8	Extension Participation	0.119	0.088	0.131	0.205*	0.013	0.068	0.196**	0.084
9	Source of Information	0.058	0.019	0.054	0.078	0.002	0.136	0.404**	0.316**
10	Mass media Participation	0.014	0.076	0.236**	0.075	0.026	0.158	0.306**	-0.371**

** Significant at 0.01 level   * Significant at 0.05 level

As increase in the education, experience, annual income, organizational participation, extension participation, sources of information and mass media participation technological knowledge might be have increased. Educated respondents easily understand the new technologies and involve more in new sericulture farming practices. Farmers had remunerative returns was one of the influencing factor to learn about new technologies to get more yield. Farmers exposure to mass media, trainings attended and consultancy pattern with sericulture officers, cocoon committee and with chawki rearing centres help to gain technological knowledge. As the age and land holding increases, technological knowledge decreases. It might be because of farmers face difficulties in understanding new technologies and they are involved more cultivation of other crops. In case of women, exposure to mass media is negatively contributing because most of them were utilized mass media for entertainment purpose.

A look at table 5 depicts there is a significant difference between men and women with respect to preparation of land and plantation (z-value 2.14*), pest and disease management (z-value 2.32*) in mulberry cultivation. Regarding silkworm management significant difference were found in selection of silkworm varieties and room management (z-value 2.09*), silkworm management in mountages (z-value 1.09*) and rules and regulations of market (z-value-2.19*) at 5.00 per cent level of probability. However, there is no significant difference found with other dimensions such as, water management and inter-cultivation, weed management and fertilizer application, mulberry harvesting and conservation,

silkworm feeding in shoot system, pest and disease management and management of montages and cocoons collection. There was significant difference between men and women with respect to preparation of land and plantation, pest and disease management in mulberry cultivation. Regarding silkworm rearing significant difference was found in selection of silkworm varieties and room management, silkworm management in mountages and rules and regulations of cocoon marketing. Preparation of land and pest and disease management is done by men only. Women involvement in selection of varieties and cleaning of equipment was less because majority of the decisions are taken by men. With regard to marketing aspect cent percent of men were involved in transportation of cocoons and had exposure on market rules and regulation, it is purely outdoor activity. Hence there was a significant difference found in all these dimensions of sericulture. However, there was no significant difference found with other dimensions such as, water management and inter-cultivation, weed management and fertilizer application, mulberry harvesting and conservation, silkworm feeding in shoot system, pest and disease management and management of montages andcocoons collection. Weeding, application of fertilizers and feeding to the silkworms are the main activities where women had almost equal knowledge with men. It is due to more number of women were involved in all the above mentioned activities along with their household activities. Experience was one of the contributing factor to both men and women.

Table 5: Difference in technological knowledge level among men and women of sericulture farming families n=600

Sl. No.	Dimensions of knowledge	Bagalakot (n=200)		z-value	Belagavi (n2=200)		z-value	Haveri (n3=200)		z-value	Total		z-value
		Men (n=100)	Women (n=100)		Men (n=100)	Women (n=100)		Men (n=100)	Women (n=100)		Men (n=100)	Women (n=100)	
A	**Mulberry cultivation**	Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)	
1	Preparation of land and Plantation	88.33 (13.80)	74 (28.67)	1.35	78.62 (19.14)	61.37 (21.80)	1.68	82.66 (15.90)	63.55 (23.88)	1.99*	84 (14.61)	67.33 (18.22)	2.14*
2	Water management and Fertilizer application	68.33 (19.03)	63.33 (21.08)	0.47	62.66 (18.64)	43.83 (23.21)	1.54	62.83 (20.16)	34 (23.25)	2.29*	64.77 (17.12)	47.05 (19.72)	1.66
3	Weed management and Inter cultivation	34.66 (21.82)	22.33 (22.36)	0.68	29.00 (15.62)	13.33 (6.65)	1.59	25.33 (9.29)	12.66 (4.7)	2.10*	29.66 (14.62)	16.11 (11.20)	1.27
4	Pest and disease management	71.28 (22.73)	56.57 (27.30)	1.54	70.07 (24.11)	38.64 (23.85)	3.46*	64.14 (22.51)	47.71 (18.71)	2.09*	66.41 (21.21)	47.64 (20.75)	**2.32***
5	Mulberry harvesting and conservation	74.33 (21.12)	68.33 (27.79)	0.42	61.16 (19.30)	43.66 (26.34)	1.31	68.5 (17.67)	51 (14.68)	1.86	68.00 (15.82)	54.33 (15.45)	1.51
B	**Silkworm rearing**												
1	Silkworm varieties and room management	92 (10.09)	90.75 (12.31)	0.08	93.75 (7.32)	73.75 (18.66)	1.99*	97.75 (4.5)	75.25 (15.98)	2.70*	94.50 (6.71)	79.91 (12.16)	2.09*
2	Silkworm rearing and feed management in the shoot system	93.87 (8.55)	84.75 (21.02)	1.13	97.37 (7.42)	86.37 (21.23)	1.38	94.50 (15.55)	91.37 (17.27)	0.38	95.25 (10.28)	87.5 (18.94)	1.01
3	Pest and Disease management	80.87 (28.85)	77.50 (30.87)	0.22	83.25 (23.61)	72.28 (22.46)	0.92	81.14 (23.84)	73.42 (21.56)	0.63	82.54 (25.21)	71.91 (27.93)	0.79
4	Silkworms management in Chandrike	76 (17.57)	68.22 (19.99)	0.87	84.66 (19.04)	52.88 (28.44)	2.78*	83.44 (15.96)	73.77 (17.12)	1.23	81.37 (15.98)	64.96 (20.29)	1.90*
5	Picking of cocoons and selling	86.16 (1464)	81.33 (17.52)	0.51	79.5 (17.80)	61.83 (38.55)	1.01	93 (12.50)	84.66 (11.79)	1.18	86.22 (11.06)	75.94 (15.56)	1.31
6	Rules and Regulations of Market	85.75 (17.55)	61.75 (7.71)	2.55*	93.00 (14.00)	61 (31.46)	1.85	92 (16.00)	78.75 (17.32)	1.12	90.25 (12.81)	67.00 (16.91)	**2.19***

* Significant at 0.05 level

Table 6 shows significant difference was found between the knowledge of men and women of sericulture families among selected districts with C.D. of 2.46. In case of men mean values of different districts ranges from 60-66. The mean value of Bagalakot district was found to be highest *i.e.* 65.26 followed by Haveri (60.47) and Belagavi (57.33). Whereas, mean values of different districts of women ranges from 51-62. Women respondents from Bagalakot had highest mean score *i.e.* 61.63 followed by Belagavi (59.35) and Haveri (51.45). The reason could be more number of men and women of Bagalakot district were found in young category and with college education. In other words younger farmers were having high level of knowledge about the sericulture technology as compared to older farmers. The respondents are youths and with more education enthusiastically involved in trainings, exhibitions of sericulture. Men and women respondents of Bagalakot had regular contact with sericulture exhibition officer, CRC (Chawki Rearing Centre) and sericulture farmers groups which have also contributed for more knowledge.

Table 6: ANOVA to compare mean scores of technological knowledge level of among sericulture farming n=600

Sl. No.	Districts	Men (n1=300)				Women (n2=300)			
		Mean	F-value	SEM	CD	Mean	F-value	SEM	CD
1	Bagalakote (n1=100)	65.26				61.63			
2	Belagavi (n1=100)	57.83	44.38*	.371	2.46	59.35	89.38*	.412	2.46
3	Haveri (n1=100)	60.47				51.45			

* Significant at 0.05 level
S.E - Standard Error
C.D - Critical Difference

Conclusion

Sericulture is more promising enterprise to the both men and women of farm households wherein, women are playing vital role in all the activities of sericulture. As sericulture is emerging as more profitable venture, more farmers are being attracted towards it. Therefore the successful farmers can be made use as progressive farmers and motivating sources to the other farmers to venture into sericulture farming through various ToT centres, developmental departments and SAUs for speedy economic growth of the farmers. Majority of the farm households had extension contact with only sericulture development department, chawki rearing and cocoon related market committee, yet because of ignorance they have no contact with other research institutions which could enhance their technological knowledge of mulberry raising and silkworm rearing. Indisputably Sericulture Development Department personnel and other research agencies and extension machinery are more committed to the cause of sericulture farmers, yet they need to redouble their efforts for overall inclusive development of various sectors/components of sericulture through effective formulation of schemes, dissemination of technical knowhow. In view of doubling the

farmers income, sericulture can play a very important role as it gives very high returns as compared to other livelihood systems of farming families. It can also help in mitigating the farmers suicide problems. Hence more appropriate extension activities can be planned and implemented.

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