Awareness and Adoption of Improved Sericulture Technologies

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Abstract

The paper attempts to analyze the awareness and adoption pattern of sericultural practices by the farmers of Thirunelveli and Virudunagar districts in Southern Tamil Nadu. The adoption rate was good for plant spacing, weed management, irrigation and leaf/shoot harvesting with respect to mulberry cultivation technology. In case of silkworm rearing, the adoption rate was very good with simple technologies such as bed spacing, shoot rearing, ventilation, moulting care, harvesting of cocoon, transportation of cocoon etc. On the other hand, the rate of adoption was less or partial with respect to application of fertilizers, rearing silkworm in separate rearing house, disinfection of rearing house and appliances, maintenance of rearing hygiene and integrated pest management practices. The correlation analysis showed that extension contact and training programmes played an important role in educating the farmers to adopt improved technologies.

Introduction

Sericulture plays a pivotal role in development of the rural economy in India because it is highly employment oriented, low capital intensive and due to the remunerative nature of the production that churns out value added products of economic importance. Tamil Nadu occupies the fourth position in the country in silk production with annual raw silk production of 1411 MT in 13,355 ha of mulberry. Though currently sericulture is widely practiced in all the districts in the state, the activities are highly concentrated in the north-western districts namely, Krishnagiri, Erode, Tiruppur, Dharmapuri, Dindigul and Namakkal.

As congenial agro-climatic conditions prevail in certain parts of southern Tamil Nadu especially in Thirunelveli and Virudunagar districts, the sericulture development programmes are implemented through the Department of Sericulture,

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Tamil Nadu and the recently established Research Extension Centre at Srivilliputtur. Currently, mulberry is cultivated in an abysmal area of 419.92 and 107.80 ha, in Thirunelveli and Virudunagar districts respectively.

The farmers can realize the benefits of improved technologies and maximize the yield and income levels, if they as such adopt technologies, which are transferred from the research institutes to the farmers' fields. However, owing to various technical, socio-economic, institutional and managerial constraints, there is always a gap between the actual and real level of adoption of technologies resulting in production inefficiencies (Anjaneya Gowda, 1993). Therefore, a regular monitoring of the adoption level of different technologies transferred to the field and the factors influencing the adoption of technologies would help the policy makers and extension workers in designing and implementing appropriate programmes for the technology transfer programme and the researchers in fine-tuning of the technologies as per the requirements of farmers. In this context, a study was taken up on the adoption pattern of sericultural practices by the farmers of Thirunelveli and Virudunagar districts with the following objectives:

(i) To understand the awareness and adoption pattern of improved sericulture technologies;

(ii) To analyze the relationship between the socio-economic characteristics of the respondents and adoption rate of technologies; and

(iii) To document the constraints faced by farmers in adoption of improved sericulture technologies.

Methodology

Thirunelveli and Virudunagar districts of Tamil Nadu were purposively selected for the study. As the sericulturists in the study area are relatively less and highly scattered, the farmers, who are practicing sericulture were selected by random sampling method using the list of farmers available with the Research Extension Centre of Central Silk Board located at Srivilliputtur in the study area. The data were collected from randomly selected 60 sericulturists using a pre-tested structured interview schedule. The data were collected during December 2009, compiled, tabulated and subjected to tabular and percentage analyses.

Results and Discussion

Awareness Pattern of Sericulture Technologies

Awareness is the first step in the adoption process. The extension agencies play an important role in creating awareness and motivating the farmers to adopt the improved technologies. The extent of awareness of different recommended technologies related to mulberry cultivation and silkworm rearing by the farmers of Thirunelveli and Virudunagar districts of Tamil Nadu was analyzed and the results are presented in Table 1. Several pests cause severe damage to mulberry cultivation and silkworm rearing, thereby affecting the quality and quantity of cocoon produced by the farmers. Therefore, control of pests is very essential to improve the yield levels. However, less than 33 per cent of the farmers were aware of Integrated Pest Management (IPM) practices for important pests of mulberry and silkworm. Most of the farmers were aware of physical and chemical methods of control of pests but were not aware of biological control methods recommended for managing the mulberry and silkworm pests. The awareness was medium with respect to the time and dosage of organic manures and synthetic fertilizers for the mulberry garden. The pruning methods were known to more than one-third of the farmers. In silkworm rearing, medium level of awareness was noticed with respect to the technologies related to incubation and black boxing of silkworm eggs, disinfection and hygiene practices and maintenance of temperature and humidity. It is also interesting to notice that 15 out of 25 technologies with respect to mulberry cultivation and silkworm rearing were known to a majority of the farmers.

Table 1: Awareness Pattern of Sericulture Technologies

Sl. No.	Category	Practice
1	**Low:** Known to less than 33% of the respondents	Integrated Pest Management (IPM) practices for mulberry pests and uzi fly
2	**Medium:** Known to 34-66% of the respondents	Dose and time of application of fertilizers Dose and time of application of manure Pruning of mulberry plants Incubation of silkworm eggs Black boxing of silkworm eggs Maintenance of temperature and humidity Disinfection chemicals and methods Maintenance of hygiene in silkworm rearing Use of bed disinfectants in silkworm rearing

Sl. No.	Category	Practice
3	**High:** Known to more than 66% of the respondents	Mulberry variety Mulberry plant spacing Weed management in mulberry garden Quantum and frequency of irrigation for mulberry garden Leaf/shoot harvesting Rearing house Shoot rearing method Silkworm bed spacing Silkworm bed cleaning Ventilation Moulting care during silkworm rearing Mountages and mounting Harvest of cocoons Sorting of cocoons Transportation of cocoons

Adoption Pattern of Sericulture Technologies

The adoption pattern of mulberry cultivation and silkworm rearing technologies is given in Table 2.

Table 2: Adoption Pattern of Sericulture Technologies

Sl.No	Practice	Adoption (%)		
		Full	Partial	No
I	**Mulberry cultivation**			
1	Variety	40.00	60.00	0.00
2	Plant spacing	90.00	6.67	3.33
3	Application of manure	30.00	70.00	0.00
4	Application of fertilizers	20.00	80.00	0.00
5	Weed management	56.67	40.00	3.33
6	Irrigation	46.67	53.33	0.00
7	Pruning	43.33	56.67	0.00
8	Shoot harvesting	93.33	6.67	0.00
II	**Chawki (young age silkworm) rearing**			
1	Incubation	46.67	53.33	0.00
2	Black boxing	36.67	60.00	3.33
3	Bed spacing	70.00	30.00	0.00

Sl.No	Practice	Adoption (%)		
		Full	Partial	No
4	Cleaning	75.00	25.00	0.00
5	Maintenance of temperature and humidity	58.33	36.67	5.00
III	**Late age rearing**			
1	Rearing house	56.67	43.33	0.00
2	Shoot rearing	100.00	0.00	0.00
3	Bed spacing	76.67	20.00	3.33
4	Cleaning	33.33	66.67	0.00
5	Ventilation	93.33	6.67	0.00
6	Maintenance of temperature and humidity	30.00	70.00	0.00
7	Moulting care	90.00	10.00	0.00
8	Mountages and mounting	63.33	36.67	0.00
9	Harvest of cocoons	96.67	3.33	0.00
10	Sorting of cocoons	46.67	53.33	0.00
11	Transportation of cocoons	100.00	0.00	0.00
IV	**Management of pests and diseases**			
1	Disinfection	43.33	56.67	0.00
2	Use of bed disinfectants	23.33	76.67	0.00
3	Maintenance of hygiene	16.67	83.33	0.00
4	Integrated pest management for mulberry pests	3.33	96.67	0.00
5	Integrated pest management for uzi fly	0.00	46.67	53.33

The results clearly indicate that almost all the technologies were adopted either fully or partially by most of the farmers. With respect to mulberry cultivation technologies, the adoption rate was good for plant spacing, weed management, irrigation and harvesting of mulberry shoot for feeding silkworm. The awareness about the advantages of wider plant spacing may be the reason for higher adoption of the technology. As water is not a scarce resource in the study area, the farmers provided adequate irrigation for the mulberry garden. As shoot harvest is a simple technology, the adoption rate was found to be very high.

About 40 per cent of the respondents adopted V1 mulberry variety, which is the superior mulberry variety recommended for silkworm rearing. The remaining farmers cultivated other mulberry varieties such as MR2, K2, S36 etc. due to non-availability of V1 mulberry cuttings/saplings, opinion of higher pest or disease incidence in V1 variety. As mulberry is a perennial crop, if one variety is planted, a farmer generally does not change to another variety unless he encounters some problem with the existing mulberry plantation. Lack of awareness appeared to be the major factor responsible for not applying organic manure and synthetic fertilizers for the mulberry garden as per recommendations by a majority of the farmers.

With respect to silkworm rearing, the adoption rate was very good with simple technologies such as bed spacing, shoot rearing, ventilation, moulting care, harvesting of cocoon, transportation of cocoon etc. Separate rearing house is ideal for silkworm rearing as it helps to maintain the specific environmental conditions such as temperature, humidity, ventilation and hygiene required for silkworm rearing to produce good quality cocoon. Construction of separate silkworm rearing house requires higher investment. Only 56.67 per cent of the respondents had a *pucca* rearing house as per the recommendations for silkworm rearing. The other farmers used either a part of their dwelling house or a make shift/temporary rearing house for silkworm rearing. Unlike in the traditional areas of Karnataka and Andhra Pradesh, where the farmers usually use the hired mountages for cocooning, most of the farmers of the study area possessed their own mountages. Therefore, the adoption rate of mountages and mounting technology was high with the farmers of the study area. Most of the farmers adopted the technologies such as maintenance of temperature and humidity, bed cleaning and sorting of cocoons, partially.

Proper disinfection of rearing house and appliances and maintenance of hygiene at the time of silkworm rearing are essential to protect the silkworm crop from diseases and ensure crop stability. Though all the farmers followed the disinfection and hygiene practices in silkworm rearing, a majority of them did not adopt as per the recommendation of research institutions. This may be due to lack of awareness of the technology by almost one third of the farmers as evident from Table 1. A majority of the respondents (96.67 %) partially adopted the integrated pest management practices i.e. physical and chemical methods for the control of

mulberry pests. Uzi fly is a serious pest of silkworm, which causes considerable damage to the sericulture industry. However, 53.33 per cent of the respondents did not take any measure to control the pest. As sericulture is not intensively practiced in the region, the pest incidence may not be as severe as in intensive sericulture areas.

Relationship between Socio-Economic Factors and Adoption of Technologies

The studies carried out by Dolli *et al.* (1992), Singhvi *et al.*, (1994) and Geetha *et al.* (2001) and Vijaya Prakash and Dandin (2005) revealed a strong association of socio-economic factors with the adoption of sericultural technologies. Therefore, the study attempted to find out the relationship between the adoption levels with socio-economic factors through a correlation analysis. In order to correlate the socio-economic variables with the adoption level of sericulture technologies, an adoption coefficient was worked out. For this purpose, full adoption was scored as 2, partial adoption as 1 and non-adoption as 0 for each technology and the total score (actual score) was worked out for each farmer, based on the level of adoption of the technologies or practices recommended. Then the adoption coefficient was computed for each farmer by using the following formula:

$$\text{Adoption coefficient} = \frac{\text{Actual score obtained}}{\text{Total score obtainable}} \times 100$$

The results of the correlation analysis are presented in Table 3. A significant and positive association was found between adoption level of sericulture technologies and education level, training undergone, extension contact and social participation. Dolli *et al.* (1992) and Srinivasa *et al.* (1998) reported that educational status of the farmers had significant relationship with the adoption of the sericultural technologies. Singhvi *et al.*, (1994) found that the rate of adoption was significantly associated with the sericulturist's mass media participation, extension contact and cosmopoliteness. Age had a negative relationship with the adoption of technologies. This shows that the older group did not evince interest in learning and adopting new technologies in spite of efforts made by the extension staff.

Table 3: Correlation Coefficients between Socio-economic Characteristics of Farmers and their Adoption Level of Sericultural Technologies

Sl. No	Variables	Correlation coefficient
1	Age (years)	- 0.4204
2	Education level (score)	0.3223*
3	Family size (score)	0.1819
4	Experience in sericulture (years)	0.1494
5	Training undergone (days)	0.3602*
6	Total land holdings (acres)	-0.0447
7	Area under mulberry (acres)	0.2041
8	Extension contact (score)	0.5563*
9	Social participation (score)	0.3604*

Note: * Significant at 10% level

Constraints in Adoption of Technologies

The adoption rates of improved sericulture technologies in general were better in the study area as compared to those in the traditional sericulture belts. However, the adoption rates were less with certain technologies. Therefore, the reasons for partial/non adoption of such technologies were elucidated from the farmers and the results are presented in Table 4. Reduction in availability of FYM from own source and lack of awareness of the quantum of application of organic manure for the mulberry garden were the major reasons for partial adoption of application of manure. About 58.33 per cent of the farmers felt that fertilizers are costly and 52.08 per cent of the respondents did not know the type and quantum of application of chemical fertilizers. Incubation and black boxing of silkworm eggs and maintenance of temperature and humidity during silkworm rearing are complex technologies, which were not known nor practiced correctly by a majority of the respondents. As the bed disinfectants were perceived as costly, majority of the respondents used less than the quantity recommended for dusting on the silkworm.

Table 4: Farmers' Opinion about Constraints in Adoption of Certain Technologies

Practice	Reasons for partial/no adoption	% of response
Application of manure	1. Non-availability of FYM	66.67
	2. Lack of awareness	23.81
Application of fertilizers	1. Costly	58.33
	2. Lack of awareness about the type and quantum of fertilizers to be applied	52.08
Incubation and black boxing	1. Lack of technical guidance and awareness of technology	60.87
Cleaning and maintenance of hygiene	1. Lack of awareness of technology	62.50
	2. Lack of interest	37.50
Maintenance of temperature and humidity	1. Complex nature of technology	70.00
	2. Lack of knowledge	36.00
	3. Difficulties in adjusting temperature and humidity in a large sized rearing hall	28.00
Use of bed disinfectants	1. Costly	60.87
	2. Difficulties in the use of chemicals (dusting)	30.43
Integrated pest management for mulberry pests	1. Apprehension in use of chemicals as the mulberry leaves are fed to silkworm	55.17
	2. Lack of awareness about bio-control agents	48.28
	3. Non-availability of bio-control agents	41.38
Integrated pest management for uzi fly	1. Apprehensions about spraying chemicals on silkworm which is an insect	53.33
	2. Non-availability of bio-control agents	40.00

The integrated management practices of pests in mulberry garden and silkworm rearing were found to be not adopted by majority of the farmers As silkworm is a delicate insect, the farmers were apprehensive about using chemicals for mulberry garden or to spray on silkworm to control insect pests. Lack of awareness and non-availability of bio-control agents were also major reasons for not adopting bio-control measures, which are one of the components of IPM.

As sericulture is relatively a new enterprise in the study area, the organizational and managerial constraints faced by the farmers in practicing sericulture were also documented and the results are presented in Table 5.

Table 5: Farmers' Opinion about Organizational and Managerial Constraints in Practicing Sericulture

Sl. No.	Constraints	Response	
		No (N = 60)	%
1	Marketing problems of cocoon in the local area	46	76.67
2	Lack of financial assistance	34	56.67
3	Difficulties in availability of inputs locally	31	51.67
4	Lack of training facilities	27	45.00
5	Labour scarcity	16	26.67
6	Lack of credit facilities	15	25.00
7	Lack of technical guidance	5	8.33

Important constraints expressed by the farmers were, problems in marketing cocoons locally (76.67%), lack of financial assistance (56.67%), non-availability of inputs in time (51.67%), lack of training facilities (45.00%), scarcity of labour (26.67%), lack of credit facilities (25.00%) and lack of technical guidance (8.33%).

Summary and Conclusion

The study has revealed that gaps in the application of various recommended technologies exist in practicing sericulture in Thirunelveli and Virudunagar districts. The awareness and adoption rates of integrated management of mulberry pests and uzi fly were less, which is a matter of concern. The rate of adoption of technologies was quite high with the simple technologies, where as it was relatively less with the technologies involving application of chemicals such as synthetic fertilizers, disinfectants, etc. The correlation analysis also showed that the extension contact and training programmes played an important role in educating farmers to adopt improved technologies. This reveals that intensified extension efforts and training programmes would bear fruitful results in popularizing improved sericultural practices in Tirunelveli and Virudunagar districts.

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