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A Study on Knowledge and Adoption Levels of Farmers on Mulberry Cultivation Practices in Chittoor District of Andhra Pradesh

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ABSTRACT: Farmers' knowledge and adoption levels play a vital role in determining the production and productivity of any crop. Similarly, in sericulture, the production and productivity of mulberry leaves are determined by the extent of knowledge possessed by the farmers on sericulture technologies and their adoption. In rural India, sericulture is an age-old tradition and a successful occupation with a high and regular income. The proper dissemination of advanced sericulture technologies and their adoption among farmers play a vital role in the development of the sericulture industry. The present investigation was focused on analysing the knowledge and adoption levels of farmers for the production of mulberry, a sole food plant for the silkworm, *Bombyx mori,* in Chittoor district of Andhra Pradesh. The study was conducted in 20 villages in Chittoor district with the objective of assessing the level of knowledge and adoption of recommended mulberry cultivation practices among farmers. For the study, 240 sericulture farmers were selected @ 12 farmers in each village and grouped into three categories, *viz*., marginal (80), small (80), and big (80), based on their mulberry land holdings. The study revealed that the farmers possess knowledge on land preparation (58.70%), mulberry variety (67.90%), method of planting (84.60%), manures (83.30%), irrigation (79.20%), weeding (80.40%), and pruning (81.20%) in all three categories (marginal, small, and big). The adoption level of the above-mentioned practices is land preparation (76.20%), mulberry variety (62.90%), method of planting (78.80%), manures (55.80%), irrigation (81.70%), weeding (81.70%), and pruning (80.40%), except in management of land preparation, weeding, and irrigation, where the adoption level is higher than the knowledge level.

The study revealed that the different categories of farmers possess a varied degree of knowledge and adoption of advanced mulberry cultivation practices. Even though appropriate, highly productive mulberry production technologies are available to attain potential mulberry leaf yield, it is not happening at the field level. This may be due to a lack of appropriate transfer of technology mechanisms, knowledge, and non-adoption of technologies. Hence, the study is aimed at analysing the knowledge and adoption level of improved sericulture technologies in Chittoor district of Andhra Pradesh, where sericulture activities are highly concentrated.

Keywords: Advanced Sericulture Technologies, Knowledge, Adoption, Marginal, Small and Big farmers.

INTRODUCTION

Sericulture offers individuals in rural areas productive employment, economic growth, and an improvement in their quality of life. As a result, sericulture becomes crucial for antipoverty programs and discourages rural residents from moving to urban areas in pursuit of work, as sericulture is one of the largest generators of employment. It provided employment to approximately 8.8 million people (2021–2022) in rural and semi-urban areas of India. Sericulture is a distinctive activity with a significant potential for employment and a remunerative nature of production. The development of farm-to-fabric creates a link between industry and agriculture. The growth of the silk industry in different sectors in the past few years is not merely due to horizontal expansion but also to vertical improvements in productivity.

Improved sericulture practices are the result of scientific research conducted by scientists in science and technology. There are a good number of improved technologies available to increase the production of mulberry leaf, cocoon, and silk and their quality. The overall increase in crop production, increase in net farm income, improvement in standard of living, changes in social structure, level of education, change in attitude and values of rural people, and increased contact with urban areas and extension agencies are all results of technological advancements. But there are a lot of gaps in the adoption of the technologies available to achieve

the potential yield. Various factors like the nature of innovation, confidence in traditional practices, level of education, family size, financial status, socio-economic status, etc. influence the adoption of recommended sericulture practices. Transfer of technology from the laboratory to the land is more important for increasing crop productivity. The level of acceptance of suggested practises by farmers affects production and productivity in sericulture (Qadri *et al.,* 2010). The majority of the mulberry acreage is concentrated in the Rayalaseema region of Andhra Pradesh, especially in drought-prone areas of Chittoor and Anantapur districts. Chittoor district is the first largest silk producing traditional sericulture belt of Andhra Pradesh, where farmers have successfully practised sericulture Padmaja and Savithri (2023).

In this context the present research was carried out on knowledge and adoption levels of Farmers on Mulberry Cultivation Practices in Chittoor District of Andhra Pradesh.

METHODOLOGY

The present investigation used an ex-post-facto research design in accordance with the objectives of the study. The present study was taken up in the Chittoor district of Andhra Pradesh. The district is the main sericulture district in the state. Mulberry acreage in the district was 46,600 (2021-2022).

Villages for the study were selected based on the concentration of mulberry acreage. Chittoor district was divided into 5 revenue divisions, and from each division, 2 mandals were selected. From each mandal, 2 villages were selected. Thus, a total of 20 villages were selected for the present study. In consultation with the sericulture officers and also based on mulberry acreage, sericulture farmers were selected by using purposive random sampling. From each village, 12 sericulture farmers were selected. Therefore, the total sample size is 240 respondents.

The best strategy for gathering data in the current inquiry was judged to be personal interviewing. To conduct the survey, an interview schedule was prepared. Then a survey was administered through a personal face-to-face interview using the questionnaire on the knowledge and adoption of mulberry cultivation practices. Data was collected and then analyzed using statistical tools like frequencies, percentages, and mean.

RESULTS

The results of the study on the knowledge and adoption level of sericulture farmers in advanced mulberry cultivation practices are presented in Table 1.

Soil testing. The table shows 42.10%, 31.70%, and 26.20% of farmers had full, partial, and nil knowledge in soil testing, and the adoption level of the sericulture farmers was 16.70%, 32.50%, and 50.80%.

Soil protection. It was observed from the results that 28.80%, 36.70%, and 34.40% of respondents had full, partial, and nil knowledge, and 19.60%, 27.90% and 52.50% of farmers adopted soil protection strategies.

Land **preparation.** From the data in Table 1, it is understood that 56.70%, 23.30%, and 20.00% of farmers had full, partial, and nil knowledge, and 76.20%, 12.50%, and 11.20% of farmers adopted full, partial, and nil advanced land preparation technologies.

Variety. Sericulture farmers had 67.90%, 17.50%, and 14.60% full, partial, and nil knowledge levels, respectively. Farmers who had knowledge on variety planted the recommended V1 variety.

Treatment of planting material. The respondents had 82.50%, 10.80%, and 6.70% of full, partial, and nil knowledge, respectively, and the level of adoption was 24.60%, 38.30%, and 37.10% full, partial, and nil in the treatment of planting material, respectively.

Spacing schedules. From the results, it is understood that 84.60%, 9.20%, and 6.20% of farmers had full, partial, and nil knowledge, respectively, and all farmers who had full knowledge (84.60%) and partial knowledge (9.20%) adopted fully and partially, and 6.20% had not adopted the recommended spacing schedules.

Manures. The data in the table indicate that 83.30%, 12.10%, and 4.60% of farmers had full, partial, and nil knowledge, respectively. In terms of adoption, 55.80% of farmers adopted the recommended dose of manure fully, 33.30% of farmers adopted partially, and 10.80% of farmers did not adopt.

Fetilizers. 34.20%, 57.50%, and 8.30% of sericulture farmers had full, partial, and nil knowledge, respectively, and the level of adoption of recommended fertilizer application by the sericulture farmers was 15.80%, 65.40%, and 18.80% full, partial, and nil adoption, respectively.

Application of foliar sprays. The study indicated 25.40%, 42.10%, and 32.50% of farmers had full, partial, and nil knowledge, respectively, and 22.50%, 48.30%, and 29.20% of farmers adopted fully, partially, and not adopted, respectively.

Irrigation. The results in Table 1 show that 79.20%, 11.70%, and 9.20% of farmers had full, partial, and nil knowledge, respectively and 81.70%, 12.50% and, 5.80% of farmers adopted fully, partially, and not adopted respectively.

Weeding. The farmers have 80.40%, 11.70%, and 7.90% full, partial, and nil knowledge, respectively, and 81.70%, 13.80%, and 4.60% full, partial, and nil adoption, respectively.

Intercropping. Sericulture farmers have 17.10%, 47.90%, and 35% of full, partial, and nil knowledge, respectively, in intercropping technologies, and 9.20%, 36.20% and 54.60% of farmers adopted fully, partially, and not adopted, respectively.

Vermicompost making. 37.10%, 30%, and 32.90% of farmers had full, partial, and nil knowledge in vermicompost making, respectively, and it is noticed that a lower percentage of farmers have converted waste to vermicompost, i.e., 6.20%, 16.70%, and 77.10% of farmers had adopted fully, partially, and not adopted, respectively.

Green Manuring. The target group of farmers of 30.80%, 31.20%, and 37.90% had full, partial, and nil knowledge, respectively; 10.80% and 9.60% of farmers adopted the application of green manures fully and

partially, respectively; and 79.60% of farmers did not adopt.

Mulching. Sericulture farmers had 16.70%, 37.50%, and 45.80% full, partial, and nil knowledge of mulching, respectively, and a lower percentage of farmers adopted the technology. The results showed 5%, 12.10%, and 82.90% of sericulture farmers had full, partial, and nil adoption, respectively.

Pruning. The data indicate that 81.20%, 12.90% and 5.80% of farmers had full, partial, and nil knowledge of pruning technology, respectively, and 80.40%, 12.10%, and 7.50% of farmers had full, partial, and nil adoption of pruning technology, respectively.

Integrated nutrient management in mulberry cultivation (INM). Farmers had 48.30%, 43.80%, and 7.90% full, partial, and nil knowledge of recommended integrated nutrient management in mulberry cultivation, respectively, and 6.70%, 21.20%, and 72.10% of farmers adopted the integrated nutrient management practice, fully, partially, and not adopted, respectively.

Integrated Pest and Disease management in Mulberry cultivation (IPDM). Farmers had 34.60%, 50.40%, and 15% full, partial, and nil knowledge of **I**ntegrated Pest and Disease management in Mulberry cultivation (IPDM), respectively, and 7.10%, 50.40%, and 42.50% of farmers adopted the IPDM fully, partially, and not, respectively.

Mechanization. The data in Table 1 indicate that 30%, 28.80%, and 41.20% of farmers had full, partial, and nil knowledge of mechanization, respectively; 8.80% and 30.40% of farmers had used mechanization fully and partially, and 60.80% of farmers had not adopted it, respectively.

Value addition. The table shows that 19.60%, 38.80%, and 41.70% of farmers had full, partial, and nil knowledge of value addition in sericulture, respectively, but utilization of waste generated in the production process is lower, i.e., 7.90% of farmers only adopted it fully, 24.60% of farmers utilized it partially, and 67.50% of farmers did not utilize the waste.

In respect of the knowledge level of farmers on mulberry cultivation practices, the majority of the farmers in the study area possess more knowledge on mulberry variety, land preparation, treatment of planting material, spacing schedule, pruning, manures, irrigation, weeding, and vermicompost making. The maximum number of farmers had partial knowledge on soil testing, soil protection, fertilizers, application of foliar sprays, INM, and IPDM measures, and the majority of farmers had nil knowledge on mulching, green manuring, mechanization, and value addition. With respect to the adoption of mulberry cultivation practices, the majority of the farmers adopted the recommended variety, spacing schedule, manures, irrigation, weeding, and pruning practices; more partial adoption was noticed in the treatment of planting material, application of foliar sprays, and IPDM practices. A greater number of farmers have not adopted the recommended technologies like soil testing, soil protection, intercropping, green manures, mulching, INM, mechanization and value addition.

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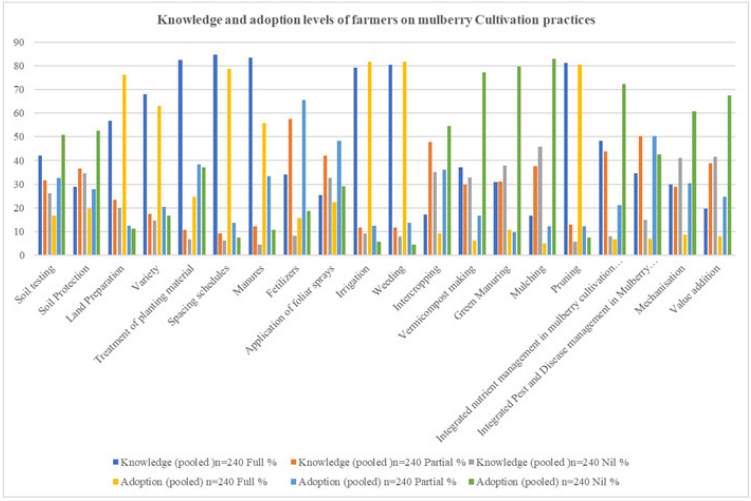

Fig. 1.

Table 1: Knowledge and adoption levels of farmers on mulberry Cultivation practices.

Sr. No.	Practice	Knowledge (Pooled) (n=240)						Adoption (Pooled) (n=240)					
		Full		Partial		Nil		Full		Partial		Nil	
		No	%	No	%	No	%	No	%	No	%	No	%
1.	Soil testing	101	42	76	31.70	63	26.20	40	16.70	78	32.50	122	50.80
2.	Soil Protection	69	28.80	88	36.70	83	34.60	47	19.60	67	27.90	126	52.50
3.	Land Preparation	136	56.70	56	23.30	48	20.00	183	76.20	30	12.50	27	11.20
4.	Variety	163	67.90	42	17.50	35	14.60	151	62.90	49	20.40	40	16.70
5.	Treatment of planting material	198	82.50	26	10.80	16	6.70	59	24.60	92	38.30	89	37.10
6.	Spacing schedules	203	84.60	22	9.20	15	6.20	189	78.80	33	13.80	18	7.50
7.	Manures	200	83.30	29	12.10	11	4.60	134	55.80	80	33.30	26	10.80
8.	Fetilizers	82	34.20	138	57.50	20	8.30	38	15.80	157	65.40	45	18.80
9.	Application of foliar sprays	61	25.40	101	42.10	78	32.50	54	22.50	116	48.30	70	29.20
10.	Irrigation	190	79.20	28	11.70	22	9.20	196	81.70	30	12.50	14	5.80
11.	Weeding	193	80.40	28	11.70	19	7.90	196	81.70	33	13.80	11	4.60
12.	Intercropping	41	17.10	115	47.90	84	35.00	22	9.20	87	36.20	131	54.60
13.	Vermicompost making	89	37.10	72	30.00	79	32.90	15	6.20	40	16.70	185	77.10
14.	Green Manuring	74	30.80	75	31.20	91	37.90	26	10.80	23	9.60	191	79.60
15.	Mulching	40	16.70	90	37.50	110	45.80	12	5.00	29	12.10	199	82.90
16.	Pruning	195	81.20	31	12.90	14	5.80	193	80.40	29	12.10	18	7.50
17.	Integrated nutrient management in mulberry cultivation (INM)	116	48.30	105	43.80	19	7.90	16	6.70	51	21.20	173	72.10
18.	Integrated Pest and Disease management in Mulberry cultivation (IPDM)	83	34.60	121	50.40	36	15	17	7.10	121	50.40	102	42.50
19.	Mechanisation	72	30.00	69	28.80	99	41.20	21	8.80	73	30.40	146	60.80
20.	Value addition	47	19.60	93	38.80	100	41.70	19	7.90	59	24.60	162	67.50

Treatment of planting material (82.50%), Spacing schedules (84.60%), Manures (83.30%), irrigation (79. 20%), weeding (80.40%)

DISCUSSION

Srinivasulu Reddy *et al.* (2010) noticed low and nil levels of knowledge in soil testing among sericulture farmers in the coastal area compared to Anantapur and Chittoor districts. Gope (2006) noticed that knowledge of soil type and testing was higher among traditional farmers than non-traditional farmers. In the present investigation, it is evident that the majority of farmers have full (42%) and partial (31.70%) knowledge of soil testing. Deepa and Sujathamma (2007) studied the adoption of technology in semi-arid conditions in the Chittoor district of Andhra Pradesh, and soil testing was not adopted by the majority of farmers. The results of the study showed that the adoption levels of soil testing among the majority of the mulberry-growing farmers were low to nil. The reason might be a lack of resources, time, belief in their own practices, overconfidence, etc.

Raju *et al.* (2019) revealed that a greater number of farmers had partial knowledge and partially adopted land preparation. In the present investigation, the majority of the farmers had more knowledge of land preparation and adopted land preparation techniques; this may be due to interaction with extension personnel.

Srinivasulu Reddy *et al.* (2010) observed that 85–100% of the farmers had full knowledge with respect to improved mulberry varieties. Deepa and Sujathamma (2007) stated that 70% of the farmers had planted the recommended mulberry variety in the Chittoor district of Andhra Pradesh. Vijaya Prakash and Dandin (2005) reported that 77.78% of the farmers adopted improved mulberry varieties. Similar observations were recorded in the present investigation because sericulture farmers were aware of the high-yielding popular V1 variety, and the majority of the farmers planted a high-yielding mulberry variety, *i.e.*, the V1 variety. This may be due to the longevity of leaf freshness and its suitability for feeding both Chawki and old-age silkworms.

Thaigarajan (2002) reported that the majority of the farmers had adequate knowledge of plant spacing. In the present investigation, it is evident that the majority of farmers had full knowledge about the different wider spacing schedules, as they were also well aware that wider spacing saves labour costs, improves qualitative and quantitative traits of mulberry leaf yield, and makes inter-cultivation operations easy to practice. Vijaya Prakash and Dandin (2005) observed that the adoption of mulberry technologies by farmers related to plant spacing is 100%; Sujatha *et al.* (2006) observed high adoption for plantation spacing.

Mallikarjuna *et al.* (2006) reported that the knowledge level of sericulturists in the application of farm yard manure in Chamarajanagar district was 82%, and Vijaya Prakash and Dandin (2005) observed that 91.80% of the farmers applied the recommended dose of FYM. In the present investigation, the majority of farmers have full knowledge of the utilization of farmyard manure and have used the farmyard manure according to the requirements. the above studies are in accordance with the present investigation.

Srinivasulu Reddy *et al.* (2010) observed that knowledge level in fertilizer application was less or nil in the coastal area compared to Anantapur and Chittoor districts. A study conducted by Mir *et al.* (2018) on the adoption of mulberry production practices in four districts of the Kashmir Valley indicated that none of

the farmers followed the recommended dose and schedule of the fertilizer application. Similar findings were reported in the present study, which clearly indicated a low level of full knowledge of the recommended dose of fertilizer application and partial application of the fertilizer dose in mulberry cultivation among the farmers.

Harishkumar *et al*. (2022) reported that the knowledge level of drip irrigation in mulberry cultivation was greater (70%) among respondents in the Arsikere taluk of Hassan district (Karnataka). Raju *et al.* (2019) stated that the majority of farmers had partial knowledge and had partially adopted the irrigation schedules in two taluks of Chamarajanagar district, namely Kollegal and Yelandur. The present investigation revealed that the majority of the farmers had full knowledge and followed the irrigation schedules.

According to Sreenivasa (1989), 100 percent of the sampled farmers had the correct knowledge of weeding. Raju *et al.* (2019) observed that the majority of the farmers had partial knowledge of weeding practices and adopted them partially. In contrast, the study revealed that the majority of the farmers had the correct knowledge of weeding practices and adopted the technology. Full adoption may be due to motivation by the extension personnel.

Rahul *et al*. (2019) stated that 44% of farmers have no knowledge of intercropping. Pradeep Kumar *et al*. (2012) revealed that none of the sericulturists (100%) had correct knowledge about the use of FYM + Neem Cake, + Marigold intercrop in mulberry. Hadimani *et al*. (2019) observed that 58.00% of the respondents had fully adopted intercropping in mulberry gardens. The present study revealed that the majority of the farmers have partial knowledge followed by nil knowledge, and the majority of the farmers have nil adoption followed by partial adoption with regard to intercropping in mulberry.

Reddy *et al.* (2012) found that 70–100% of farmers had no knowledge of seri-residue composting. Rathore and Srinivasulu (2018) reported that sericulture can be made sustainable and economical by recycling all the organic wastes of sericultural origin as compost and vermicompost. Pradeep Kumar *et al.* (2012) noticed that 44.16% of the sericulturists had low knowledge about organic farming practices in the Chickballapur district of Karnataka. The study revealed that the majority of the sericulturists (37.10%) had full knowledge, followed by nil and partial knowledge on composting and vermicomposting. With regard to adoption, a significant gap was observed between knowledge and acceptance of the technology.

Raju *et al.* (2019) stated that the majority of farmers did not have knowledge of mulching in two taluks of Chamarajanagar district, namely Kollegal and Yelandur. Sujatha *et al*. (2006) observed that the adoption of mulching practices in mulberry cultivation was nil or low. The observations of the study were also in accordance with the above studies.

According to Sariful Islam (2004), farmers adopted under JICA had sufficient knowledge of mulberry cultivation, with 100% knowledge of pruning methods in mulberry cultivation. From the present investigation, it is evident that the majority of farmers had full knowledge of and adopted the pruning technology.

Madhu Prasad *et al.* (2005) observed that 100 percent of sericulture farmers had knowledge of animal excreta-based manures in Kolar district of Karnataka. However, the majority of the farmers had high knowledge on the usage of neem cake, pongamia cake (91.00%), and groundnut cake (86.00%). Only 49–52 percent of respondents had knowledge of the application of biofertilizers. Sujatha *et al*. (2006) observed that adoption was nil or low for practices like biofertilizer. Narayanaswamy *et al.* (2005) observed that the majority of farmers in Kolar district have moderate knowledge about organic sericulture practices. Pradeep Kumar *et al.* (2012) noticed that the majority (44.16%) of the sericulturists had low knowledge about organic farming practices. Singh *et al.* (2012) studied the effect of integrated nutrient management (INM) on mulberry plants and discussed the advantages of INM. In the present investigation, the majority of the farmers had full knowledge of integrated nutrient management (INM) in mulberry cultivation, but their adoption level was very low. It may be due to the non-availability of finance.

Sakthivel *et al*. (2012) examined the gap in knowledge of integrated pest management practices in the Thirunelveli and Virudunagar districts of Tetamil Nadu. Harishkumar *et al*. (2022) noticed that the knowledge level of mulberry cultivation mechanisation was greater than 70%, but the adoption level was lower compared to the knowledge level. In the present investigation, the knowledge level of the majority of farmers on mechanisation was found to be low or nil, indicating a lack of awareness on mechanization. The results are in accordance with Shivam *et al.* (2020), who reported a low level of knowledge among the farmers under study on the challenges of farm mechanization. In the present investigation, the adoption level of mechanisation in mulberry cultivation was found to be nil, followed by partial adoption by the majority of farmers due to the high cost of purchasing mechanised equipment.

CONCLUSIONS

In respect of the knowledge level of farmers on mulberry cultivation practices, the majority of the farmers in the study area possess more knowledge on mulberry *variety*, land preparation, treatment of planting material, spacing schedule, pruning, manures, irrigation, weeding, and vermicompost making. The maximum number of farmers had partial knowledge on soil testing, soil protection, fertilisers, application of foliar sprays, INM, and IPDM measures, and the majority of farmers had nil knowledge on mulching, green manuring, mechanization, and value addition. With respect to the adoption of mulberry cultivation practices, the majority of the farmers adopted the recommended variety, spacing schedule, manures, irrigation, weeding, and pruning practices; more partial adoption was noticed in the treatment of planting material, application of foliar sprays, and IPDM practices. A greater number of farmers have not adopted the recommended technologies like soil testing,

soil protection, intercropping, green manures, mulching, INM, mechanization and value addition. The adoption of technologies requires significant financial assistance from the government and extension services for sericulture farmers. For the rapid and high income of the farmers, different approaches, such as group/community farming, farmers field schools, demonstrations, exposure visits, etc., need to be considered. The study reveals that there is still a significant gap between the level of knowledge and adoption. The gap can be reduced by providing appropriate technologies and financial support with subsidies, which may enhance the adoption levels of the technologies by the farmers. The majority of the farmers partially adopted mulberry cultivation practices when compared to full and nil-adoption levels. In this regard, concerted efforts must be made by the extension personnel to motivate the farmers for the adoption of mulberry production technologies to enhance the qualitative and quantitative characteristics of mulberry leaf. Expansion of sericulture activities to obtain reasonable income: design different suitable approaches for the farmers to improve qualitative and quantitative yield parameters and reduce the yield gaps compared with potential yield. As sericulture is a women-oriented industry, it is essential to empower women sericulture farmers technologically to bridge the technological gap and obtain potential yields.

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