



Discriminate the Knowledge and Adoption Level of Bivoltine Technologies of Trained and Untrained Sericulture Farmers, Tamil Nadu, India

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ABSTRACT

Background: Sericulture development is intimately related to applying science and technology in the sector. Thus, the extent to which farmers use improved technology directly influences the amount of cocoon production and the economic and social benefits. Training has been regarded as the most crucial factor for increasing cocoon production.

Methods: The study was conducted with 300 trained and untrained farmers from the same district. Trained farmers (Batch-wise) underwent five days of training at Tamil Nadu Sericulture Training Institute; Hosur. The parameters were discriminated by trained and untrained farmers practicing bivoltine technologies. The bivoltine technologies have two parts: 1. Mulberry cultivation and 2. Silkworm rearing.

Result: The knowledge and adoption level of mulberry cultivation in R-value is highly associated with trained farmers at 0.85 and 0.98 untrained associated with 0.72 and 0.64 respectively. The knowledge and adoption level of silkworm technologies in R-value is highly associated with trained farmers at 0.98 and 0.67 untrained associated with 0.64 and 0.52 respectively. The knowledge and adoption levels of mulberry cultivation and silkworm technologies play a crucial role in cocoon productivity. The R-values presented reflect the strength and significance of the association between these variables and the trained vs. untrained farmers. The evidence strongly suggests that training is essential in enhancing the knowledge and adoption levels of mulberry cultivation and silkworm technologies.

Key words: Bivoltine technologies, Knowledge and Adoption, R-value, Silkworm rearing.

INTRODUCTION

Sericulture, is a significant agricultural activity adopting bivoltine sericulture technologies. Trained farmers, who have received formal education and exposure to modern practices, are generally expected to have a higher level of knowledge and adoption of such technologies. In contrast, untrained farmers, who may rely on traditional methods and local knowledge, tend to exhibit lower adoption rates of newer technologies like Bivoltine sericulture. Very few studies have attempted to understand the impact of training on the yield and quality of silk cocoon production in India. Studies (Rahmathulla *et al.*, 2006) showed that the knowledge level of trainees on sericulture technologies had increased by an average of 57.67 per cent after the training. Similarly, farmers' cocoon yield increased to an extent of 26.50 per cent after their training in new sericulture technologies (Rahmathulla *et al.*, 2012). Other important findings showed the increasing level of confidence in bivoltine production by the trained farmers and also their change of attitude in risk-taking decisions (Rahmathulla *et al.*, 2009). Therefore, the present study is being proposed to find out how trained farmers could change the productivity and quality of bivoltine cocoons over untrained farmers in the field. This study aims to discriminate the knowledge and adoption levels of bivoltine technologies between trained and untrained sericulture farmers in Tamil Nadu.

MATERIALS AND METHODS

The study was conducted (2022-2023) in the Coimbatore district of Tamil Nadu, where most farmers rear the bivoltine

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cocoon, a potential area for bivoltine sericulture. The districts favor and support the environment for mulberry cultivation and silkworm rearing. Farmers accepted and adoption of new sericulture technologies. Out of 10 blocks, 5 blocks selected were purposively selected because more training was conducted in these blocks. 24 villages were selected randomly based on the area under mulberry cultivation. A sample of 150 trained and untrained farmers was selected. Primary data formulated with well-defined objectives based on the interview schedule was prepared. In this, all relevant information was furnished to collect data from respondents in the study area. The study aims to discriminate between two groups. The study statistical tools

used for correlation and multiple regression, and the chi-square test.

RESULTS AND DISCUSSION

Discriminate knowledge level bivoltine technologies

Discriminate knowledge level of moriculture trained and untrained

Table 1 revealed a non-significant relationship with trained farmers' soil testing and reclamation 0.493, planting spacing 0.828, pruning method 0.536, IPM 0.064 and IDM 0.077. The result of the study is consistent with (Hadimani *et al.*, 2017). Highly significant with mulberry variety 0.00, INM 0.00, IWM 0.04 and harvesting of mulberry at the right time 0.00 in trained farmers. The study results are consistent with Beula Priyadarsini and Vijayakumari (2013). The untrained farmers' non-significant planting spacing is 0.045, pruning method 0.640, INM 0.286, IWM 0.07, IPM 0.387, IDM 0.356, and Use of mulberry at the right time 0.071. The study results are consistent with Hadimani *et al.* (2017).

a highly significant relationship is between soil testing and reclamation 0.005, and mulberry variety 0.001. R-value in mulberry cultivation is highly associated with trained farmers at 0.67 and untrained associated with 0.16. This substantiated similar findings by Ravi Kant *et al.* (2023) and Beula *et al.* (2016).

Discriminate between silkworm technologies that are trained and those that are untrained

Table 2 revealed that the non-significant relationship between trained farmers' rearing shed 0.625, disinfection 0.631, late age feeding 0.275, moulting care 0.018, IDM 0.846, IPM 0.247, marketing 0.247, cocoon harvesting 0.413 and crop/year 0.480 and untrained farmers rearing shed 0.309, disinfection 0.909, late age feeding 0.334, moulting care 0.162, IDM 0.904, IPM 0.711, marketing 0.547, cocoon harvesting 0.519 and crop/year 0.102. The highly significant trained and untrained farmers 0.000. R-value in silkworm technologies is highly associated with trained farmers at 0.85 and untrained associated with 0.72.

Table 1: Discriminate the knowledge level of moriculture.

Content	Trained farmers		Untrained farmers	
	Coefficients			
	B	Sig	B	Sig
(Constant)	68750.437	0.000	89554.780	0.000
Soil testing and reclamation	-5658.364	0.493	38803.901	0.005
Mulberry variety	-103719.988	0.000	55070.175	0.001
Planting spacing	-4154.735	0.828	-70921.573	0.045
Pruning method	6698.640	0.536	-9713.900	0.640
INM	52756.249	0.000	-23637.803	0.286
IWM	26377.069	0.004	59361.871	0.007
IPM	18590.577	0.064	20899.557	0.387
IDM	15389.466	0.077	22070.601	0.356
Use of mulberry at the right time	23532.365	0.000	-58660.428	0.071
R-Value	0.67	0.16		

Table 2: Discriminate the knowledge level of silkworm technologies.

Content	Trained farmers		Untrained farmers	
	Coefficients			
	B	Sig	B	Sig
(Constant)	-17748.77	0.085	126880.500	000
Rearing shed	7442.940	0.625	-5106.638	0.309
Disinfection	5654.443	0.631	-487.815	0.909
Late age feed	-20895.473	0.275	-8766.105	0.334
Moulting care	20073.881	0.018	-8131.983	0.162
IDM	2084.247	0.846	-386.669	0.904
IPM	7730.331	0.247	1092.509	0.711
Marketing	-12176.365	0.393	-4259.713	0.574
Cocoon harvesting	-4236.920	0.413	-4376.920	0.519
Crop/per/year	967.971	0.480	-2126.197	0.102
Reared of dfls annual	197.971	0.000	78.442	0.000
R-Value	0.85	0.72		

Discriminate adoption of level bivoltine technologies**Discriminate adoption level of moriculture trained and untrained**

Table 3 revealed that non-significant relationship between trained farmers' soil testing and reclamation 0.672, planting spacing 0.019 pruning method 0.527, IPM 0.417 and IDM 0.536 Highly significant with the use of mulberry at the right time 0.000 in trained farmers. The result of the study is consistent with Hadimani *et al.* (2017); Choudhury *et al.* (2017) and Deepa *et al.* (2007). The untrained farmers' non-significance to planting spacing 0.650, pruning method 0.364, INM 0.969, IWM 0.082, IPM 0.609, IDM 0.502 and Use of mulberry at the right time 0.529 and highly significant relationship is soil testing and reclamation 0.005 and mulberry variety 0.001. R-value in mulberry cultivation is highly associated with trained farmers at 0.98 and untrained at 0.64.

Discriminate adoption level of silkworm technologies trained and untrained

Table 4 revealed that the non-significant relationship between the silkworm technologies trained farmers' late age feeding

0.996, moulting care 0.406, IPM 0.247, marketing 0.605 and untrained farmers' rearing shed 0.788, IPM 0.245, marketing 0.096 and crop/year 0.102. The highly significant relationship in adopted silkworm

Technologies is by trained rearing house, disinfectant, cocoon harvest at the right time, crop/per/year and reared silkworm annum. The result of the study is supported by the findings of Deepa and Sujathamma (2007) and Kumaresan *et al.* (2009). Untrained farmers had rearing shed, disinfection, moulting care, IDM, cocoon at right time harvest and reared silkworm annum. Cocoons at the right harvest had a direct effect on price during auctioning. The study findings Krishnamurthy, 2012. R-value in silkworm technologies are highly associated with trained farmers at 0.67 and untrained associated with 0.52.

Discriminate knowledge level bivoltine technologies

The trained farmers in revenue = - 27.297 + 2.837 (soil testing) - 41.643 (Mulberry variety) + 9.785 (Planting space) - 6.194 (Pruning method) + 17.249 (INM) + 4.799 (IWM) + 5.687 (IPM) + 4.061 (IDM) + 23532.365 (Harvesting right time) Based on the r^2 value independent variables are 98% defined

Table 3: Discriminate the adoption level of moriculture.

Content	Trained farmers		Untrained farmers	
	Coefficients			
	B	Sig	B	Sig
(Constant)	-27.297	0.005	989.308	0.000
Soil testing and reclamation	2.837	0.672	83.663	0.066
Mulberry variety	-41.643	0.019	24.876	0.650
Planting spacing	9.785	0.527	-62.056	0.029
Pruning method	-6.194	0.480	-2.849	0.364
INM	17.249	0.019	123.758	0.969
IWM	4.799	0.556	48.331	0.082
IPM	5.687	0.417	-40.130	0.609
IDM	4.061	0.536	-71.283	0.502
Use of mulberry at the right time	23532.365	0.000	-31.960	0.529
R-value	0.98	0.64		

Table 4: Discriminate silkworm technologies in trained and untrained.

Content	Trained farmers		Untrained farmers	
	Coefficients			
	B	Sig	B	Sig
(Constant)	13586.944	0.000	426911.198	0.000
Rearing shed	7342.940	0.000	-1632.539	0.788
Disinfection	4658.603	0.000	-18225.473	0.000
Late age feed	-184.584	0.996	35571.682	0.004
Moulting care	12997.135	0.406	-22961.331	0.001
IDM	2084.247	0.054	-11773.571	0.005
IPM	10393.437	0.247	-4626.432	0.245
Marketing	-7827.754	0.605	-15042.500	0.096
Cocoon harvesting	-4236.920	0.000	-33407.515	0.002
Crop/per/year	947.371	0.000	-3126.189	0.102
Reared of Dfls annual	207.971	0.000	88.442	0.000
R-Value	0.67	0.52		

over dependent variables. The above is moderately correlated and has a linear trend. Untrained farmers' revenue = +989.308 +83.667 (Soil testing) + 24.876 (Mulberry variety) -62.056 (Planting space)-2.849(Pruning method) +123.758 (INM)+48.331(IWM)-40.130 (IPM)- 71.283 (IDM)-31.960 (Harvesting right time). Some kinds of studies were done by Elumalai and Murugesh (2019); Harish *et al.* (2022) and Tayade *et al.*, 2016. Based on the r^2 value independent variables are 64% defined over dependent variables. The rest of the variables do not show a significant impact over the dependent variable. Fig 1 (a) the trained farmers, histogram showing the bell-shaped curve which represented normal distribution in revenue. Fig 1 (b) the untrained farmers, histogram shows the slight bell-shaped curve which represents the normal distribution in revenue.

The trained farmers in Revenue = -17748.771 + 7442.940 (Silk) + 5654.433 (Disinfection) - 20895.473 (Late age feeding) + 20073.881 (Moulting care) + 2084.247 (IDM) + 7730.331 (IPM) -12176.365 (Marketing) + 967.971 (Crop/Year) +197.335 (Reared of Dfls annual). Based on the r^2 value independent variables are 85% defined over dependent variables. The above is moderately correlated and has a linear trend. Among the variables Moulting care and rearing of annual DFLs showed significant impact over the dependent variable. The rest of the variables do not show a significant impact over the dependent variable Fig 2 (a). The histogram shows the bell-shaped curve which represents the normal distribution in yield in trained farmers.

The untrained farmers Revenue = 126880.500 - 5106.638 (Silk) - 487.815 (Disinfection) - 8766.105 (Late age feeding) - 8131.983 (Moulting care) - 386.669 (IDM) + 1092.509

(IPM) + 4259.713 (Marketing) -2126.197 (Crop/Year) +78.442 (Reared of Dfls annual). Based on the r^2 value independent variables are 72% defined over dependent variables. Moderately correlated. Among the variables, the Rearing of Annual DFLs only shows a significant impact on the dependent variable. The results of the study are supported by the findings of Mani *et al.* (2006) and Hiriyanna *et al.*, 2009. The rest of the variables show no significance over the dependent variable. The above Model shows that the intercept has a Positive value and Spacing, Irrigation, Shoot Harvesting, IPM and IDM have shown negative impacts over the dependent value. Soil, variety, INM, IWW, and Reared of Dfls have a positive impact over the dependent variable Fig 2 (b). The histogram does not show the bell-shaped curve which represents an abnormal distribution in revenue. The result of the study is supported by the findings of Meenal (2006) and Lakshmanan *et al.* (2007).

Discriminate adoption level trained and untrained farmers

The study revealed that trained farmers Cocoon yield = - 27.297 + 2.837 (Soil) - 41.643 (Variety) + 9.785 (Spacing) - 6.194 (Shoot Harvesting) + 17.249 (INM) + 4.799 (IWW) + 5.687 (IPM) + 4.061 (IDM) + 0.834 (Reared of Dfls annual). Based on the r^2 value independent variables are 98% defined over dependent variable. Highly correlated and has a linear trend. Among the variable's variety, INM and Rearing of DFLs annually have significant impacts on the dependent variable. The above results are in line with the findings of Ravi *et al.* (2023) and Ovais *et al.* (2021). Spacing, irrigation, shoot harvest, IWW, IPM and IDM do not

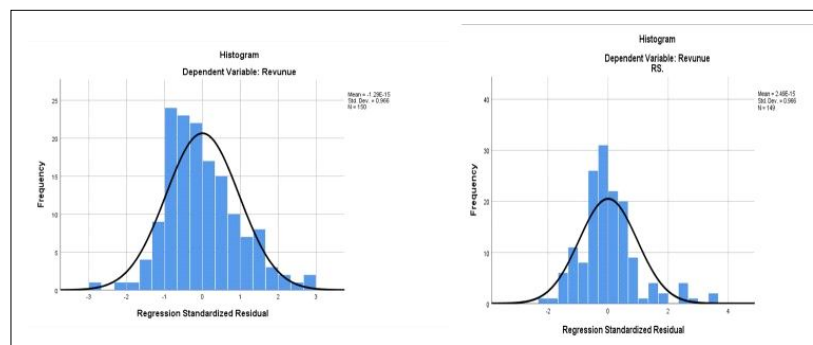


Fig 1: (a), (b) Knowledge of bivoltine technology in mulberry cultivation technology in trained and untrained farmers.

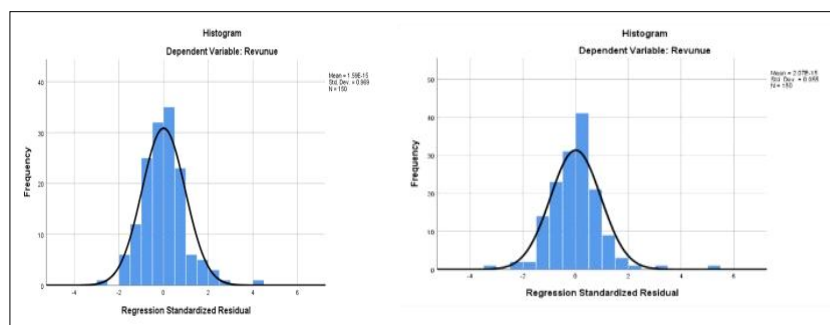


Fig 2: (a), (b) Knowledge in bivoltine technology in silkworm technology in trained and untrained farmers.

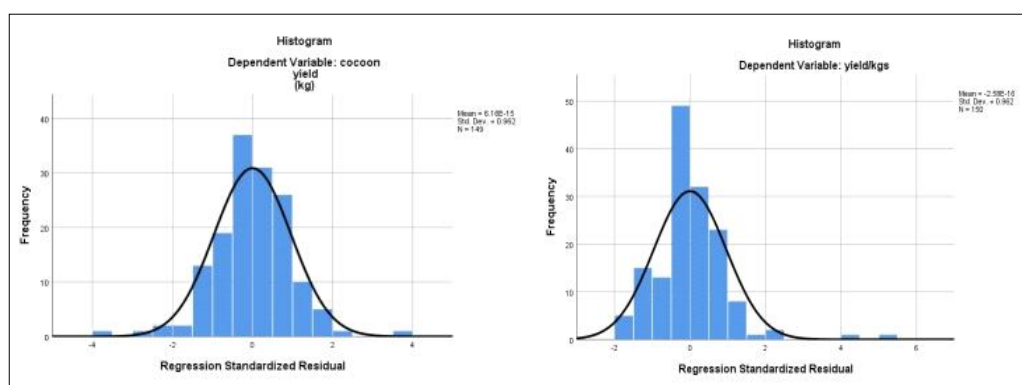


Fig 3: (a), (b) adoption of bivoltine technology in mulberry cultivation by trained and untrained farmers.

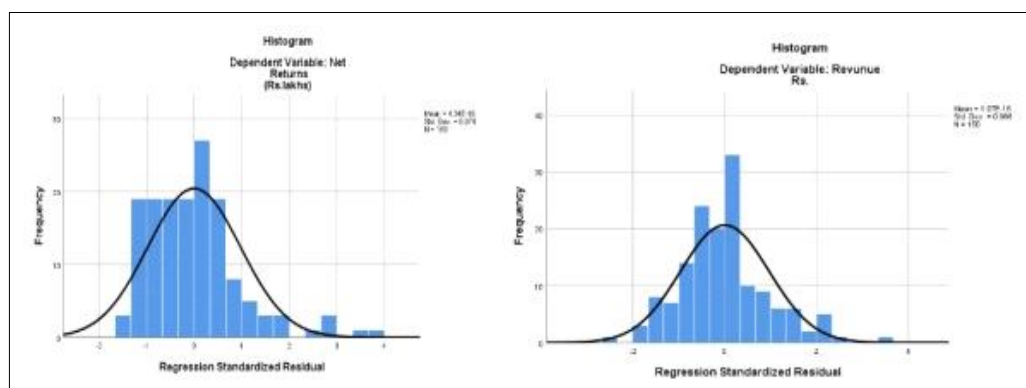


Fig 4: (a), (b) Adoption of bivoltine technology in silkworm technology in trained and untrained farmer.

impact significantly over dependent variable. Some kinds of the results were given by Parthasarathi (2002), IPM in trained farmers was much higher on biological and physical identification of pests and predators. The training positive effect on farmers. The above Model shows that the intercept has a Negative value and variety, Irrigation has shown negative impacts over the dependent value. Soil, Spacing, Shoot Harvesting, INM, IWW, IPM, IDM, and Reared of DfIs have a positive impact over the dependent variable. Fig 3 (a) the trained farmers, histogram showing the bell-shaped curve which represented normal distribution in yield. Fig 3 (b) the untrained farmers, histogram shows a slight bell-shaped curve which represents abnormal distribution in yield.

The study revealed that untrained farmers Cocoon yield = $989.308 + 83.633 (\text{Soil}) + 24.876 (\text{Variety}) - 24.876 (\text{Spacing}) - 62.056 (\text{Irrigation}) - 2.849 (\text{Shoot Harvesting}) + 123.758 (\text{INM}) + 48.331 (\text{IWW}) - 40.130 (\text{IPM}) - 71.283 (\text{IDM}) - 31.960 (\text{Harvesting Mulberry at right time}) + 0.016 (\text{Reared of DfIs annual})$. Based on the r^2 value independent variables are 64%. Defined over the dependent variable. Highly correlated and has a linear trend. Among the variables, Garden Spacing shows a significant impact on the dependent variable. The rest of the variables do not show a significant impact over the dependent variable. The above Model shows that the intercept has a Positive value and Spacing, Irrigation, Shoot Harvesting, IPM, CRC garden, and IDM have shown negative impacts over the dependent value. Soil, variety, INM, IWW and Reared of DfIs have a

positive impact over the dependent variable. Fig 4 (a) the trained farmers, histogram shows the bell-shaped curve which represents the normal distribution in yield. Fig 4 (b) The untrained farmers, histogram showed a slight bell-shaped curve which represented an abnormal distribution in yield. The above results are in line with the findings of Harishkumar *et al.* (2022).

CONCLUSION

The trained farmers were highly associated with cocoon production an R-value of 0.890 and untrained farmers had less level adopted in cocoon yield R-value of 0.308. The trained farmers proved that training is essential for high yield cocoon production. The trained farmers had an R-value of 0.922 and the untrained farmers had 0.552. The cost of production wise trained farmers C:B ratio = 0.59:1 and untrained farmers C:B ratio = 0.68:1. so in clearly known training on yield and return highlights the relationship for trained farmers. The evidence strongly suggests that training is essential in enhancing the knowledge and adoption levels of mulberry cultivation and silkworm technologies. The significant associations observed in trained farmers indicate that well-structured training programs can lead to notable improvements in sericulture practices. Moving forward, it is crucial to prioritize farmer training and capacity-building efforts to maximize the potential for growth and sustainability in sericulture.

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Author contribution

The first author, a research scholar, conducted the entire set of surveys under the guidance of the second author.

Ethical statement

Not applicable.

Conflict of interest

We, the authors of this research paper, declare that we have no conflicts of interest to disclose regarding the research, its findings and the integrity of the work.

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