International Research Journal of Human Resource and Social Sciences
ISSN(O): (2349-4085) ISSN(P): (2394-4218)
Impact Factor 6.924 Volume 9, Issue 09, September 2022
Website- www.aarf.asia, **Email** : editoraarf@gmail.com

INTERACTIONS BETWEEN SERICULTURISTS AND SERICULTURAL TECHNOLOGIES

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ABSTRACT

*The agricultural research network in India is one of the biggest in the world, and it has produced many useful new tools. The main aim of the study is Interactions Between Sericulturists and Sericultural**.** Several suggested methods in sericulture were analysed, such as the use of chosen technology in mulberry farming and silkworm rearing.The investigation of the farms' technical efficiency showed that the adoption of new technology in the field significantly cut input utilisation waste.*

Keywords: Agricultural, Network, Interaction, Efficiency, Technology

1. INTRODUCTION

1.1 Transfer of Technology (TOT)

The agricultural research network in India is one of the biggest in the world, and it has produced many useful new tools. Due to insufficient knowledge sharing, most farmers continue to rely on antiquated techniques. Hence, meeting the requirements of specific farmers has proven difficult for policymakers and field officials. In contrast, farmers' receptivity to new ideas is a multivariate function. It seems to reason that a more active and engaged social group would be more receptive to novel ideas than a less engaged one. The dynamic peer group may be persuaded to accept new ideas with the help of education and extension programmes. It is well acknowledged that the spread of technology has a significant impact on rural economies, particularly on the creation of new jobs and higher incomes. Productivity growth may be attributed to the combined R&D efforts of the many companies and institutions involved.

Changes in land-use intensity, cropping, and crop mixture are all for the better thanks to modern technology, which requires a lot of both money and labour to implement. The increased agricultural output is a welcome side effect. Yet, the efficiency with which innovations are adopted is a direct cause of the pace of change. Using new technology is a choice that the farmers must make. The state's extension agencies have launched dynamic and effective Transfer of Technology (TOT) programmes, which have contributed to the high rate of technology adoption at the farmer level. The current research analysed the effect of technology adoption in sericulture on production.

The goal of technology transfer (TOT) is to introduce farmers to novel technical components or systems and pique their interest in them so that they may assess them in the context of their particular agricultural practises and economic circumstances. To get farmers interested in and using cutting-edge scientific technologies, extension programmes often engage the media. Farmers who are interested in a new technology may want more in-depth information on the technology before they can learn how to utilise it and assess whether or not it is worth the investment. Collective practises such as workshops, presentations, and field trips are common at this point. Farmers may learn more about these techniques and how to integrate the new technology into their operations by reading in-depth pamphlets that they can take home with them. By and large, most farmers learn about emerging technologies (based on indigenous research) via informal webs of word of mouth.

1.2 Adoption Process: Stages in Farm Practice and Acceptance

Each person goes through five stages—known as AIETA, or "Awareness, Interest, Evaluation, Trial, and Adoption"—before they fully adopt a new farming technique or invention.

Awareness stage:they find out that the novel concept exists but don't know anything more about it.

Interest stage:the person has an active interest in learning more about the invention and does so actively.

Evaluation stage: The person considers how the novel concept applies to his immediate and foreseeable future context before deciding whether or not to implement it.

Trial stage: Rather than only theorising about the potential benefits of a novel concept, the person puts it to use in a pilot project.

Adoption stage:the person makes extensive use of the novel concept.

2. LITERATURE REVIEW

Khan, Gulzar & Rashid(2021) New technologies in sericulture are being developed with the goals of lowering farmers' workloads and saving money. Often, the requirements and suggestions from the field inform such R&D initiatives. This article argues that post-adoption studies are just as important as those conducted before a technology is adopted in order to properly evaluate its effectiveness, the success of any extension initiatives, and the likelihood of its continued use in the field.

Taufique, Mohammad &Hoque, Areful (2021) Rural sericulture is a labor-intensive agricultural cottage enterprise. For those on the lower socioeconomic scale, it's a boon to the job market. According to the report, India produced 28523 metric tonnes of raw silk in 2015–16. All of the information for this research came from the Central Silk Board in Mysore, Karnataka, hence it is considered secondary. Our nation's Sericulture output is second only to China's. The term "Queen of Textile" is often used to refer to sericulture. Many states in India are important for raising silkworms: Karnataka, Tamil Nadu, Andhra Pradesh, West Bengal, Assam, and Jammu and Kashmir. As this is happening, the state has to deal with a number of issues, such as the unstable pricing of cocoons, a shortage of storage space, an inadequate market, inadequate funding, etc. In our nation, India, sericulture has a lot of promise. If the current trend continues, by 2050, California will be responsible for 65% of the world's bi-voltine silkworms, which are raised in mulberries.

Rajeshwar, Jakkawad&Patange (2019) With the recent growth in Sericultural land in the region represented by the Aurangabad district in the Marathwada state, it seemed like a good place to conduct the current research. Two villages in Paithan, KekatJalgaon and Vihamandava, and two villages in Phulambritaluka, Dongargaon and Pimpalgaon, were chosen at random for the research. A total of eighty participants participated in this research, with a sample size of twenty sericulturists drawn at random from each of the four villages. Each interview with a respondent followed a predetermined timetable. The results showed that the respondents had a medium yearly income, three years of experience in sericulture production, a low level of social involvement, a medium usage of information sources, and a high level of extension contact; they were also young and had a high level of education. There was widespread expertism among sericulturists.

Sr, Jakkawad&Patange, Dr &Ahire, Rakesh (2019) As Sericultural land has been expanding in the Marathwada region in recent years, this research was conducted there. KekatJalgaon and Vihamandava in Paithantaluka, and Dongargaon and Pimpalgaon in Phulambritaluka, were chosen on purpose for the research. Eighty people participated in the research, with twenty sericulturists chosen at random from each of the four villages. Each interview with a respondent followed a predetermined timetable. The respondents had a medium annual income of Rs 41501 to 161000/-, a medium level of social participation, a medium level of use of information sources, a high level of extension contact, and a medium area under mulberry cultivation (0.31 to 0.40 hectares) with three years of experience in cultivation. Most sericulturists have a moderate degree of sericulture practise adoption.

Dayananda, &Kamble, C.K. (2008) The Anekal division of Bangalore district in the Indian state of Karnataka is renowned as a bivoltine seed region that produces high-quality seed cocoons for the sericulture business. One of the most important factors in making high-quality cocoons is the availability and amount of mulberry leaf. Sericulturists' mulberry crop yields directly correlate to how extensively they utilise ITP (integrated technology package) for improving crop yields and quality. Between 2004 and 2005, a research was undertaken in the division to determine the effects of ITP on leaf production, the degree of understanding and adoption of sericulturists with regard to ITP, and the barriers to ITP adoption. There was a clear indication that the leaf yield may be increased by 37.43% (44700 kg/ha/yr) by using ITP, compared to the current yield level of 32525 kg/ha/yr. Forty-two percent of respondents had a low degree of understanding on ITP, while thirty-three percent had a very low level of knowledge, and nineteen percent had a very high level of knowledge. Around 42.50 percent of respondents placed themselves in the middle of the adoption spectrum, while the remaining 30 and 27.50 percent fell into the low and high categories, respectively. The primary challenges that sericulturists experienced were a lack of understanding about particular technologies (83.75 percent), a lack of availability of technical supervision (81.25%), a lack of accessible financing (61.25 percent), and the uncertainty of irrigation and electricity (30 percent).

3. METHODOLOGY

3.1 Farmers' Reliance on Sericulture Technology

Several suggested methods in sericulture were analysed, such as the use of chosen technology in mulberry farming and silkworm rearing. The adoption score was then used to determine the farmers' propensity to embrace the new method. Twenty different forms of progress were taken into account during the research. The adoption score was calculated by giving equal consideration to each of the new, better practises. Grades were given based on the extent to which each measure was adopted. For example, a score of 2 was awarded for full adoption of a technology practise, a score of 1 for partial adoption, and a score of 0 for no adoption.

For each farmer, we calculated their adoption coefficient.

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

The technological gap index was also used to evaluate the state of technology in relation to certain best practises.

$$\text{Technological gap index} = \frac{R - A}{R} \times 100$$

Where; R = Recommended technology

A = Technology actually adopted by the farmers

All of the farmers who filled out the survey (n = 240) had their levels of technology adoption analysed. The manufacture of a silk cocoon requires the use of twenty separate procedures throughout the fields of mulberry farming technology and silkworm rearing technology. Technology adoption among farmers was mapped out to show the relationship between the two.

4. RESULTS

In some cases, farmers were found to have embraced the technologies just partially, whereas in others, they had adopted them completely. Important methods such as irrigation (74.17%), shoot growing of silkworm (66.67%), collecting silk cocoon (60.42%), and silkworm bed spacing (60.17%) were found to be used by the majority of farmers. In contrast, methods including silkworm mounting (9.58%), temperature and humidity regulation (22.92%), plant protection measures (23.33%), and integrated pest management (IPM) of uzi fly (28.03%) were the least popular among farmers for implementation in sericulture.

Table 1: Increased Use of Suggested Sericultural Technology

Sl. No .	Technology	Extentofadoption			Adoption Coefficient	Technology Gap Index
		No adoption	Partial adoption	Full adoption		
1	Improvedmulberryvariety	33	64	143	59.58	40.42
2	Spacinginmulberrygarden	36	71	134	55.60	44.40
3	FarmYardManure	69	65	106	44.17	55.83
4	ChemicalFertilizer	18	113	110	45.64	54.36
5	Plantprotectionmeasures	162	22	56	23.33	76.67
6	Irrigation	0	62	178	74.17	25.83
7	Leafharvesting	9	39	193	80.08	19.92
8	Rearinghouse	41	64	135	56.25	43.75
9	Chawkirearing	86	48	106	44.17	55.83
10	DisinfectionofRearingHouse	27	81	132	55.00	45.00
11	Maintenanceofhygiene	45	87	108	45.00	55.00
12	Shootrearingofsilkworm	80	0	160	66.67	33.33
13	Silkwormbedspacing	33	63	145	60.17	39.83
14	Silkwormbedcleaning	40	85	116	48.13	51.87
15	Temperatureandhumidity	69	116	55	22.92	77.08
16	Moultingcare	26	81	133	55.42	44.58
17	Beddisinfection	6	109	125	52.08	47.92
18	Mountingofsilkworm	173	44	23	9.58	90.42
19	Harvestingsilkcocoon	95	0	145	60.42	39.58
20	IPMofuzifly	44	128	67	28.03	71.97
Overall					49.32	50.68

Most places where sericulture is new have adopted bivoltine programmes thanks to the efforts of research and development institutions. This resulted in a rise in unit productivity by increasing the spread of crucial technology for creating bivoltine silk cocoons. Producers of bivoltine and hybrid silk cocoons used widely varying rates of technological adoption. To examine the efficiency with which new technologies are adopted in sericulture, breeders of silkworms were divided into two categories: those who raised bivoltine (CSR hybrid) silkworms and those who raised crossbreed silkworms. This is a breakdown of the frequency with which certain sericulture methods have been used by both bivoltine (CSR hybrid) and crossbreed silkworm growers.

4.1Bivoltine (CSR hybrid) Silkworm Growers' Embrace of New Sericulture Methods

Table 8.2 shows that among the rearers of bivoltine (CSR hybrid) silkworms, the majority who fully adopted important practises utilised technologies such as leaf harvesting (100%), improved mulberry variety (89%), spacing in mulberry garden (89%), shoot rearing of silkworms (87%), disinfection of rearing house (83%), silkworm bed spacing (82%), bed disinfection (80%), and harvesting of silk cocoons (79%). (71 per cent), However, some respondents adopted the technologies either in part or not at all; these individuals were classified as non-adopters or incomplete adopters for the purposes of the research. Mounting and cocoon collection (89.5%), plant protection (64.42%), temperature and humidity maintenance (50.96%), and silkworm pest and disease control all had quite high rates of partial or non-adoption of the technologies, as measured by the technological gap index (50.00 per cent). Consistent with previous research by Doddagadad40 and Shankar et al., this study provides more evidence that several variables affect the rate at which sericulture methods are adopted.

Table 2: Bivotine (CSR hybrid) Silkworm Growers' Uptake of Suggested Farming Methods

Sl. No.	Technology	Extent of adoption(No.)			Adoption Coefficient(%)	Technology Gap Index(%)
		No adoption	Partial adoption	Full adoption		
1	Improvedmulberryvariety	3	12	89	85.58	14.42
2	Spacinginmulberrygarden	2	13	89	85.58	14.42
3	FarmYardManure	4	21	79	75.96	24.04
4	ChemicalFertilizer	4	27	73	70.19	29.81
5	Plantprotectionmeasures	61	6	37	35.58	64.42
6	Irrigation	0	33	71	68.27	31.73
7	Leafharvesting	1	3	100	96.15	3.85
8	Rearinghouse	13	30	60	58.25	41.75
9	Chawkirearing	26	13	65	62.50	37.50
10	DisinfectionofRearingHouse	6	14	83	80.58	19.42
11	Maintenanceofhygiene	10	27	67	64.42	35.58
12	Shootrearingofsilkworm	17	0	87	83.65	16.35
13	Silkwormbedspacing	9	13	82	78.85	21.15
14	Silkwormbedcleaning	15	28	61	58.65	41.35
15	Temperatureandhumidity	6	47	51	49.04	50.96
16	Moultingcare	13	18	73	70.19	29.81
17	Beddisinfection	2	22	80	76.92	23.08
18	Mountingofsilkworm	74	19	11	10.58	89.42
19	Harvestingsilkcocoon	25	0	79	75.96	24.04
20	IPMofuzifly	39	13	52	50.00	50.00
Overall					66.85	33.15

4.2Crossbreed Silkworm Growers' Embrace of Sericulture Technology

Table 3 shows that most crossbreed silkworm farmers have fully embraced key methods such irrigation (74.94%), leaf harvesting (67.65%), a rearing house (55.15%), silkworm shoot raising (53.68%), and silk cocoon gathering (55.85%). (49.26 per cent). Partial/non-adopters were also found for the following technologies: improved mulberry varieties (60.29 percent), spacing in mulberry gardens (66.91 percent), chemical fertiliser (72.79%), plant protection measures (86.03%), chawki rearing (69.85 percent), disinfection of rearing houses (63.97 percent), mounting, and cocoon harvest (90.44 percent), and silkworm pest and disease management (90.44 percent) (88.97 per cent).

Table 3: Crossbreed Silkworm Growers' Uptake of Suggested Sericultural Methods

Sl. No.	Technology	Extentofadoption(No.)			AdoptionCoefficient(%)	TechnologyGap Index(%)
		Noadoption	Partialadoption	Fulladoption		
1	Improvedmulberryvariety	30	52	54	39.71	60.29
2	Spacinginmulberrygarden	34	57	45	33.09	66.91
3	FarmYardManure	65	44	27	19.85	80.15
4	ChemicalFertilizer	14	85	37	27.21	72.79
5	Plantprotectionmeasures	101	16	19	13.97	86.03
6	Irrigation	0	30	106	77.94	22.06
7	Leafharvesting	8	36	92	67.65	32.35
8	Rearinghouse	27	34	75	55.15	44.85
9	Chawkirearing	60	35	41	30.15	69.85
10	DisinfectionofRearingHouse	20	67	49	36.03	63.97
11	Maintenanceofhygiene	35	60	41	30.15	69.85
12	Shootrearingofsilkworm	63	0	73	53.68	46.32
13	Silkwormbedspacing	24	49	63	46.32	53.68
14	Silkwormbedcleaning	24	57	55	40.44	59.56
15	Temperatureandhumidity	63	69	4	2.94	97.06
16	Moultingcare	14	62	60	44.12	55.88
17	Beddisinfection	4	87	45	33.09	66.91
18	Mountingofsilkworm	99	24	13	9.56	90.44
19	Harvestingsilkcocoon	69	0	67	49.26	50.74
20	IPMofuzifly	5	116	15	11.03	88.97
Overall					36.07	63.93

All the innovations were accepted in whole or in part by the sample farmers, and this is the most persuasive parameter. This might be attributable to the fact that the Central Seircultural Research and Training Institute, Mysore and the Department of Sericulture have been working together to execute JICA and the Institute-Village Linkage Programme (IVLP) in the research region. It has been shown that the bivoltinerearers have a higher rate of technology adoption than the more conventional crossbreed rearers.

4.3Reasons Why Suggested Sericultural Technology Aren't More Widely Used

Sericulturists in the research region had their perceptions of the barriers to adopting new sericulture methods analysed, and the results showed that few of the barriers really existed. Several of these current limitations are described in more detail below (Table 4)

Table 4: Why Sericulturists Haven't Fully Embraced Newer Technology

Sl. No.	Constraints	Typeofsilkwormrearers					
		Crossbreedsilkwormrearers		Bivoltine(CSRhybrid)silkwormrearers		Total	
		(N=104)		(N=136)		(N=240)	
		Number	%	Number	%	Number	%
1	Non-availabilityofinputsontime	75	72.22	38	27.78	113	47.04
2	Fluctuationsincocoonprice	58	55.56	53	38.89	111	46.11
3	Separaterearinghouse	35	33.33	19	13.89	54	22.31
4	Highcostofinputs	35	33.33	57	41.67	91	38.06
5	Lackofinvestment	26	25.00	4	2.78	30	12.41
6	Lackofawareness	20	19.44	26	19.44	47	19.44
7	Non-availabilityoflabour	32	30.77	54	39.71	86	35.83

Non-availability of inputs on time (47.04%), fluctuations in cocoon price (46.11%), high cost of inputs (38.06%), lack of availability of labour (35-83%), separate rearing house (22.31%), lack of awareness (19.44%), and lack of investment (5.92%) were found to be the most significant barriers to the widespread adoption of this technology (12.41 per cent). Non-timely availability of inputs was the biggest problem for crossbreed silkworm farmers (72.22 percent), followed by fluctuations in cocoon price (55.56 percent), the need for a dedicated rearing space (33.3

percent), the high price of inputs (33.3 percent), a shortage of workers (30.77 percent), a dearth of capital (25.0 percent), and a lack of knowledge (11.1 percent) (19.44 per cent). High cost of inputs (41.67 percent), lack of labour (39.71 percent), fluctuations in cocoon price (38.89 percent), lack of availability of inputs on time (27.78 percent), lack of awareness (19.44 percent), a separate rearing house (13.89 percent), and a lack of investment were all cited as barriers to the adoption of bivoltine sericultural technologies by those who raise bivoltine (CSR hybrid) silkworms (2.78 per cent). Findings showed that the rate of limitations was greater for crossbreed silkworm rearers than for bivoltine (CSR hybrid) silkworm rearers. Farmers' socioeconomic status was also shown to be a significant factor in determining whether or not they would embrace bivoltine silkworm rearing, the research concluded. That's why it's important to take into account the farmers' socioeconomic level and the limitations that come with it while implementing new technology in sericulture.

5. CONCLUSION

According to the data, the new technology has had a big impact. Increased output may be attributed to better mulberry agriculture and silkworm rearing procedures, as well as the creation of superior silkworm hybrids and the development of resilient mulberry types. The investigation of the farms' technical efficiency showed that the adoption of new technology in the field significantly cut input utilisation waste. As compared to other major crops, sericulture has the potential to be the most productive and lucrative, as well as the most effective in terms of creating new jobs. Despite the fact that technological advancements sped up sericulture, the industry as a whole is still subject to the influence of a number of elements, both biological and technical in character, as well as socioeconomic in impact. There was a considerable divide between the farmers who had adopted the technology and those who had not in the research region. Bivoltine sericulture was largely determined by the existing price of the silk cocoon, as well as by the level of knowledge, attitude, and competence of the farmers who practised it.

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