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Adoption Behaviour of Sericulture Farmers Regarding Improved Technologies of Jorhat District of Assam

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ABSTRACT

The research study was undertaken in the purposively selected Jorhat and Majuli (undivided) districts of Assam during the year 2018-19 with an objective to analyze the adoption behaviour of sericulture farmers regarding improved technologies and their socio-economic relationship with the adoption behaviour for enhancement of production and productivity at farmers level. Sericulture has been practiced traditionally and a large portion of rural people earn their livelihood from sericulture sector in this region. The present findings revealed that adoption of improved sericulture technologies was in medium category for majority of the respondents 76.67 per cent in eri culture, 66.67 per cent in muga culture and 76.67 per cent in mulberry culture. Due to lack of awareness of improved sericulture technologies as well as poor living conditions the adoption level of sericulture technologies among the seri farmers of Jorhat district was very low. There was gap in dissemination and adoption of improved sericulture technologies in pre and post cocoon sector for growth and development of sericulture in acreage of food plants, rearing of silkworm and production and productivity of cocoon and silk. Hence, the study recommends that adoption of scientific technologies among the seri farmers has significant impact on growth and development of sericulture as well as economic benefit of the farmer.

INTRODUCTION

Sericulture is an agro-based industry and one of the prominent enterprise and it involves a series of on-farm, off-farm and industrial activities. Sericulture plays an important role in the development of rural community both economically and socially. It is an excellent household activity which brings consequential change both in social and economic condition of the rural and semi-urban areas by adopting all the necessary improved sericulture technologies (Priyadarshini and Kumari, 2013). Proper adoption of improved sericultural technologies by the farmers is vital for obtaining higher yield. The potential of sericulture remains unexplored due to problems in conventional production practices (Jayaram and Indumati, 2010). The success of any technology largely depends on its effective adoption and utilization in the field. A wide gap exists between the recommended sericultural technologies and their adoption by the farmers. To fill this gap and plan for suitable intervention strategy, it is necessary to understand farmers' knowledge and adoption level for improved technologies.

Sericulture is predominantly practiced in North East India by small and marginal farmers. Assam enjoys a unique distinction by producing all the four commercial natural silks *viz.*, muga, eri, mulberry and tasar. The raw silk production in Assam during the year 2016-17 was 3811 MT which accounted for 12.55% of the country's total raw silk production (Anon., 2016-17). The Jorhat district of Assam plays a major role in silk production. Sericulture has been practiced traditionally in the district and a large portion of rural people earn their livelihood from the sericulture sector. Presently, the sericulture is practiced in about 492 seri-villages of the district covering an area of 638 hectare under silkworm food

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plants cultivation with engagement of nearly 10 thousand families in various sericultural activities. The district produced 84.81MT raw silk during the year 2016-17 which include 82.24 MT eri raw silk, 0.29 MT muga raw silk and 2.28 MT mulberry raw silk (Anon., 2017). Majuli, the largest inhabited river island of the world is located in the Brahmaputra river of Assam. It was a subdivision of the Jorhat district. In 2016 it became the first island to be made a district in India and declared as the 33rd districts of Assam. This area is one of the most prolific sericulture growing area in the regions in which 125 hectares area is under host plantation and about 55,635 families are directly engaged in sericulture sector. Among sericulture farmers 9030 are seri rearers, 7572 are muga rearers and 14,441 are mulberry rearers (Mili, 2019). Despite this, majority of the silkworm rearers are still inclined to follow their traditional practices for silkworm culture and production of silk in Jorhat district. In order to examine the potentiality of increasing adoption of improved sericulture practices an effort was made to assess the adoption behaviour of sericulture farmers towards improved technologies and relationship of socio- economic characteristics with the adoption behaviour in Jorhat district of Assam.

METHODOLOGY

The study was conducted in the purposively selected Jorhat and Majuli (undivided) districts of Assam. The primary data was collected form 120 sericulture farmers following the personal interview method. Three development blocks namely Baghchung (Jorhat), Titabar (Jorhat) and Jengrai (Ujoni Majuli) were selected because sericulture has been traditionally practiced in this region. From each selected development block, two villages and 20 sericulture farmers were selected randomly from each of the villages namely Tamulbari, Pangiria form Jorhat, Kochukhat and Lahong Kachari Gaon from Titabar under Jorhat district, Kumarbari and Chawrekia Gaon from Majuli (undivided) district. The adoption behaviour of silkworm rearers was measured by developing standardized structured interview schedule on the basis of package and practices of eri, muga and mulberry rearing. Two response categories namely ‘adoption’ and ‘non adoption’ were given for each of the practices with score 1and 0 respectively. The respondents were categorized into 3 categories by computing the mean and standard deviation. The three groups were - low adoption level (< Mean- SD), medium adoption level (between Mean ± SD) and high adoption level (>Mean + SD). In order to assess the extent of relationship between the selected dependent and independent variables correlation coefficient (r) were calculated with the help of Pearson’s formula of correlation coefficient.

RESULTS AND DISCUSSIONS

Adoption level of improved sericulture technologies

Data presented in Table 1 revealed that majority 76.67 per cent of the rearers exhibited medium level of adoption of improved eri culture, 66.67 per cent in muga culture and 76.67 per cent in mulberry culture respectively. Sonowal (2016) reported that majority 61.25 per cent of the respondents had medium level of adoption regarding extend of adoption of scientific ericulture practices. Pegu (2018) also reported that majority 69.16 per cent had medium level of adoption while conducting her study on the traditional knowledge and cultural practices of muga silk production in North Lakhimpur district. Reddy et al., (2020) mentioned that 61 per cent of sericulture farmers possessed medium level of adoption of improved mulberry cultivation practices.

Eri culture

It was evident from the Table 2 that majority (58.33%) of the rearers adopted high yielding host plant varieties, integrated pest management practices for collection and destruction of affected plants and shoots (73.33%) and used pest and disease resistant varieties (56.66 %). Rearers adopted improved method of seed production technology for disinfection of grain age house (55.00%), surface sterilization of eggs (33.33%) and use of nylon net bag for oviposition was only (25.00%). Regarding silkworm rearing technology 100 per cent rearers adopted late age rearing, use of traditional spinning machine takli (93.33%), bed cleaning (91.66 %), early stage rearing (88.33%), transportation and marketing of cocoons (75.00%), timely brushing of worms (73.33%), used hybrid variety of eri silkworm for rearing (53.33%), disinfection of the rearing room and appliances (46.67%), separate rearing house (45.00%), use of bed disinfectant (21.67%), improved spinning machine (21.67%), bamboo strip type mountage for cocooning (20.00%) and maintaining optimum requirement of temperature and humidity was only (10.00%). The identical findings were reported by Sonowal (2016). Whereas 41.67 per cent of the rerarers adopted crop insurance policy under scheme Assam Agribusiness and Rural Transformation Project (APART). Further rearers adopted various ITK practices like kharika (100%), semi dried banana leaves (88.33%), khar (76.66%), chakori – pera (68.33%) and rice straw (63.33%).

Muga culture

It can be observed form Table 3 that majority of the rearers selected their rearing area away from road side (83.33%), prepared

Table 1. Distribution of silkworm rearers based on adoption level of improved technologies

Sericulture technologies	Level of adoption	Percentage (%)	Mean	S.D.
Eri culture (n=60)	Low (<12)	8.33	15.33	3.20
	Medium (In between 12 -18)	76.67		
	High (>18)	15.00		
Muga culture (n=30)	Low (<17)	10.00	20.90	3.49
	Medium (In between 17-24)	66.67		
	High (>24)	23.33		
Mulberry culture (n=30)	Low (<11)	6.66	11.13	3.27
	Medium (In between 11-17)	76.67		
	High (>17)	16.67		

Table 2. Adoption Behaviour of sericulture farmers with respect to improved eri culture technologies n=60

Technologies	Adoption Percentage
Host plant cultivation technologies	
Use of high yielding host plant varieties	58.33
Integrated pest management	
Collection and destruction of affected plants and shoots	73.33
Use of pest and disease resistant varieties	56.66
Use of improved method seed production technology	
Disinfection of grain age house	55.00
Use of nylon net bag for oviposition	25.00
Surface sterilization of egg	33.33
Silkworm rearing technology	
Use of hybrid variety of eri silkworm	53.33
Use of separate rearing house	45.00
Early stage rearing	88.33
Late stage rearing	100.00
Bed cleaning	91.66
Timely Brushing of worms	73.33
Disinfection of the rearing room and appliances	46.67
Use of bed disinfectant	21.67
Use of bamboo strip type mountage for cocooning	20.00
Maintenance of optimum requirement of temperature and humidity	10.00
Transportation and marketing	75.00
Use of improved spinning machine	21.67
Use of traditional spinning machine (takli)	93.33
Crop insurance	
Crop policy	41.67
ITK used	
Chakori – pera	68.33
Kharika	100.00
Semi dried banana leaves	88.33
Rice straw	63.33
Khar	76.66

bamboo fences around their rearing area (73.33%) and classified som leaves according to the shape of leaves (66.66%). Regarding seed cocoon selection and preservation, 100 per cent adopted the practice of preservation of seed cocoon at chokori pera, transportation of seed cocoon at dusk (56.66%) and selected healthy brood by observing behaviors of silkworm (50.00%). On the other hand, it is seen that during copulation of moth, rearers used to hang kharika in jori (63.33%), in chak (36.67%) and used the process of jumuthi (60.00%). In case of rearing of silkworm 100 per cent adopted brushing of kharikas during the morning hours of the day, avoided use of cosmetics, scented products, and cutting nails, etc., during rearing period, used chaloni for transferring the muga larvae form one host plant to another, transferred mature worms to jalies and used khora or bamboo basket for collection of mature worms, spreading banana leaves on the base of the host plants (66.66%), banana pseudo stem as a barrier (66.66%) and banana leaf (53.33%). Regarding disease and pest management practices 100 per cent used batolu guti and dhenu to drive away the birds and predator, sprayed cow dung solution to bordering area of the rearing field (66.66%), dusted ash on and around the base of the tree (63.33%), dusted turmeric powder to protect from red ants(50.00%), hanged kochu twigs on the tree (40.00%), clean water kept in a transparent polythene bag and hang in the trees to protect the worms from uzi fly infestation (26.67%) and plastered the hole with mud in tree trunk to protect form stem borer infestation (16.67%). During post rearing operation 100 per cent of the rearers adopted both the practice of stifling by keeping the cocoons on a bamboo made tray over the fire smoke in the kitchen *(*dhowachang) and through sun drying, rearers used dhankhar as a degumming agent during cocoon cooking (93.33%), kolakhar (40.00%), hingori leaves for preparation of jali (73.33%), mango leaves (63.33%) and som leaves (26.67%). It further revealed that 100 per cent used bhir or bhowri for reeling

Table 3. Adoption Behaviour of sericulture farmers with respect to improved muga culture technologies n=30

Technologies	Adoption Percentage
Selection of the rearing area and host plants	
Rearing area away from roadside	83.33
Preparation of bamboo fences around the rearing area	73.33
Classification of som leaves according to the shape of the leaves	66.66
Seed cocoon selection and preservation	
Selection of healthy brood by observing the behaviour of silkworm	50.00
Transportation of seed cocoon at dusk	56.66
Preservation of seed cocoon at chokori pera	100.00
Copulation of moth	
Hanging of kharika-	
Chak	36.67
Jori	63.33
Using the process called Jumuthi	60.00
Rearing of silkworm	
Brushing of kharikas during morning hours of the day	100.00
Spreading of banana leaves on the base of the host plants	66.66
Avoid use of cosmetics, scented products, cutting of nail, etc. during rearing period	100.00
Barrier tied around the tree trunk by-	
Banana pseudo stem	66.66
Banana leaf	53.33
Use of chaloni for transferring the muga larvae	100.00
Transferring of mature worms to jalies	100.00
Use of bamboo basket (khora) for collection of mature worms	100.00
Disease and pest management	
Dusting of ash on and around trees	63.33
Dusting of turmeric powder around the base of the trees	50.00
Spraying of cow dung solution to boarding area of the field	66.66
Clean water kept in a transparent polythene bag and hang in the tree	26.67
Hanging of kochu twigs on the tree	40.00
The rearers cover the infestation of stem borer hole by plastering with mud on the tree	16.67
Use of pellets (batolu guti) and bow (dhenu) to drive away birds and predators	100.00
Post rearing operation	
Stifling of cocoon–	
Use of dhowachang (smoke stifling)	100.00
Sun drying	100.00
Cocoon cooking-	
Use of Kolakhar	40.00
Use of Dhankhar	93.33
Types of jali for cocooning-	
Hingori	73.33
Mango	63.33
Som	26.67
Reeling Machine-	
Bhir	100.00
Improved Machineries	26.67

of muga cocoons and improved machines (CSR&TI motorized cum pedal operated reeling cum twisting machine) was (26.67%).

Mulberry culture

Table 4 reveals that regarding mulberry cultivation technology 100 per cent of the rearers used vermi-composting, adopted high yielding host plant varieties (63.33%), prepared nursery bed management practices (56.66%), wider spacing (30.00%) and pruning and training (23.34%). Rearers adopted integrated pest management practices for collection and destruction of affected plants and shoots (56.66%) and control of uzifly (26.67%). Findings revealed that in case of improved method of seed production technology, disinfection of grain age house (66.66%), surface sterilization of eggs (43.34%) and used nylon net bag for oviposition (20.00%). Regarding silkworm rearing technology 100 per cent of the rearers adopted late stage rearing practices, timely brushing of worms and cocoon harvesting and brushing, bed cleaning (93.33%), early stage rearing (90%), disinfection of the rearing room and appliances (60.00%), used traditional reeling machine (60.00%), used hybrid variety for rearing (46.67%), transportation and marketing (43.34%), separate rearing house (40.00%), bamboo strip type mountage for cocooning (26.67%) and maintained optimum requirement of temperature and humidity was only (13.34%). Further rearers adopted the ITK practices like rice straw (63.33%) and tea branches (43.34%) as a mountage for cocoon spinning. There was no single mulberry rearers who adopted recommended fertilizer dose and applications, use of pesticides and use of pest and disease resistant varieties. Qadri et al., (2010) reported that majority of the farmers had poor rate adoption of method and quantity of application of fertilizers, manure, recommended varieties, spacing and plant protection measures. It could be observed from the present data that the reason for poor rate of adoption of method and quantity of application of fertilizes, use of pesticides, use of disease and pest resistant varieties attributed lack of knowledge and poor extension contact. It has been reported that lack of knowledge and poor extension contact is the primitive factor for non adoption of improved sericultural technologies (Mir et al., 2018).

Table 4. Adoption Behaviour of sericulture farmers with respect to improved mulberry culture technologies n=30

Technologies	Adoption Percentage
Mulberry cultivation technology	
Use of high yielding varieties	63.33
Wider spacing	30.00
Recommended fertilizer dose and application followed	0.00
Vermi-composting	100.00
Preparation of nursery bed and management	56.66
Pruning and training	23.34
Integrated pest management	
Use of pesticides	0.00
Collection and destruction of affected plants and shoots	56.66
Use of pest and disease resistant varieties	0.00
Control of Uzifly	26.67
Use of improved method of seed production technology	
Disinfection of grain age house	66.66
Use of nylon net beg for oviposition	20.00
Surface sterilization of eggs	43.34
Silkworm rearing technology	
Use of hybrid variety	46.67
Use of Separate Rearing House	40.00
Early stage rearing	90.00
Late stage rearing	100.00
Bed cleaning	93.33
Brushing of worms	100.00
Disinfection of rearing room and appliances	60.00
Use of bamboo strip type mountage for cocooning	26.67
Maintaining optimum temperature and humidity	13.34
Cocoon harvesting and brushing	100.00
Transportation and marketing	43.34
Traditional machines for reeling	60.00
ITK used	
Use of tea branches	43.34
Rice straw	63.33

Relationship between the adoption behaviour and socio-economic characteristics

It is evident from the Table 5 that out of seven independent variables the variable annual family income (r = 0.481) had positive and significant relation with the adoption behaviour of eri silkworm rearers. Age (r = -0.022), education (r = -0.093) and size of operational land holding (r = -0.009) had negative and non significant relation but extension contact (r = 0.245), decision making ability (r = 0.061) and training exposure (r = 0.055) had positive and non-significant relation with the adoption behaviour of eri rearers. Variable annual family income had significant relationship with the composite technological gap in adoption of sericulture practices (Dakhani et al., 2013). Patra et al., (2018) in their study observed annual family income to be significant and positively correlated with adoption behaviour of mandarin growers. Shasani et al., (2020) observed that education level and land holding did not have any significant relations with the level of adoption of groundnut cultivation technology. Results also revealed that out of seven independent variables no single variable had positive and significant relation with the adoption behaviour of muga rearers, whereas size of operational land holding (r = -0.106), annual family income (r = -0.036) and training exposure (r = -0.089) had negative and non significant relation with the adoption behaviour of muga rearers. Age (r = 0.274), education (r = 0.125), extension contact (r = 0.046) and decision making ability (r = 0.098) had positive and non significant relation with adoption behaviour. Kumar et al., (2012) found that age, education and extension participation had non-significant relationship with knowledge of sericulturists on organic

Table 5. Correlation between the adoption behaviour with socio-economic characteristics of the silkworm rearers

Variables	Correlation coefficient (r) value		
	Eri rearers (n=60)	Muga rearers (n=30)	Mulberry rearers (n=30)
Age	-0.022^{NS}	0.274^{NS}	-0.171^{NS}
Education	-0.093^{NS}	0.125^{NS}	-0.392*
Size of operational land holding	-0.009^{NS}	-0.106^{NS}	-0.195^{NS}
Annual family income	0.481*	-0.036^{NS}	-0.058^{NS}
Extension contact	0.245^{NS}	0.046^{NS}	0.038^{NS}
Decision making ability	0.061^{NS}	0.098^{NS}	-0.389*
Training exposure	0.055^{NS}	-0.089^{NS}	0.033^{NS}

******Significance at 0.05 level of probability NS –Non-Significant*

farming practices. The variable education (r = -0.392) and decision making ability (r = -0.389) had negative but significant relation with the adoption behaviour of mulberry rearers. Age (r = -0.171), annual family income (r = -0.058) and size of operational land holding (r = -0.195) had negative and non significant whereas extension contact (r = 0.038) and training exposure (r =0.033) had positive and non significant relation with adoption behaviour of mulberry rearers. Mishra et al., (2020) reported that variable education was found to be significant with adoption of improved apiculture practices in Arunachal Pradesh. Shasani et al., (2020) also revealed that education level had a significant relation with the level of adoption of the scientific practices of composite carp culture technology.

CONCLUSION

The present findings indicated that sericulture in this region is regarded as a very limited and traditional technology which is adopted by the farmers and still remain as a backward venture. It facilitated in accessing various training needs of farmers to enhance their qualities and characteristics for promotion of sericulture in selected region. Several improved technologies, in pre and post cocoon sector have been developed by the various research organizations for increasing production and productivity of silk. The Department of Sericulture, Govt. of Assam has created sufficient infrastructure for sericulture development with state fund and also financial support from Govt. of India is available through Central Silk Board. Further loans, grants, subsidies and other inputs are generously distributed to the rearers through various developmental schemes. Effective extension intervention may aid the process of intensification for full scale commercialization of silk production by facilitating adoption of recommended package of practices Hence, in order to extend the adoption rate in these areas, action plan needs to be taken by the extension personnel by identifying the progressive rearers and train them in the use of improved technologies, which will go in a long way in enhancing income of sericulture farmers.

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