Garret Ranking of Constraints Perceived by Silkworm Rearers in Sericulture Enterprise

Abstract:

The current investigation primarily delves into the challenges faced by sericulture growers in mulberry and cocoon production. Sericulture, a highly competitive and capital-intensive enterprise, is prevalent across rural and semi-urban areas in India. This industry not only contributes to household income but also generates employment opportunities for entire families, with women actively participating in various facets of sericulture activities. A multistage sampling design was employed to select districts, tehsils, villages, and sericulture growers for the study. Specifically, Beed, Parbhani, and Jalna districts were purposively chosen in the Marathwada region due to their significant sericulture production. Two tehsils from each district and four villages from each tehsil were then selected, resulting in a total of 24 villages with 240 sample respondents. The study utilized Garret's ranking technique to assess the constraints affecting the adoption of sericulture production.The study identified four key types of constraints in the examined area: economic, technical, marketing, and supply constraints. According to Garret's ranking, the primary economic constraint was the high cost of inputs, including FYM, planting material, and chemical fertilizers. In the realm of technical constraints, a lack of information about Uzi fly control emerged as the major hurdle. Marketing constraints were predominantly characterized by fluctuations in cocoon prices, ranking highest in prominence. Additionally, insufficient FYM availability was highlighted as a significant supply constraint.

Keywords: sericulture, Mulberry, Constraints, cocoons production, capital-intensive enterprise, income and employment.

Introduction

Sericulture stands out as a rural agro-industry with a global presence. What makes the Sericulture Sector special are its rural roots, its environmentally and economicallysustainable practices, particularly benefiting the poor, small-scale farmers, agricultural labourers, and especially women. Throughout all its stages, sericulture demands significant labour inputs, making it a labour-intensive industry. Sericulture is extremely competitive and capital-intensive enterprise which is widely practicedall over India in rural and semi-urban area (Yadav, 2008). The term 'Silk' is usually associated with textiles specifically, the fibres unraveled from cocoons spun by silkwormBombyx mori (Vollrath et. al., 2009). Silk is a fibroin made of proteins secreted in the fluid state as single filament by a caterpillar, popularly known as 'silkworm'. These silkworms feed on the selected food plants and spin cocoons as a 'protective shell' to perpetuate the life.

Silk has some special characteristics like natural sheen and inherent affinity for dyes, light weight, soft touch and high in durability that makes it more qualitative in nature. Because of these unique characteristics silk is termed as "Queen of Textiles". Cultivation of mulberry plants is known as Moriculture. Around 20 species of mulberry are available, of which four are common: *Morus alba, M.indica, M.serrata, and M.latifolia*. The origin of silk was first found in the country of china, in the world. Globally, China ranks first followed by India in the production of silk. The major silk producing states in the country are Karnataka, Andhra Pradesh, Assam and Bodoland, West Bengal, Jharkhand and Tamil Nadu.

In the sericulture production family members can do work at their individual level hence these project can be termed as lower investment with higher return within the short gestation period. For the countries like India, which is having farming base along with high population and small holdings, sericulture is a boon and tailor-made enterprise (Suriyanarayanan and Tamilselvi, 2007). In the agriculture sector, sericulture is the only cash crop that gives returns within 30 days. Sericulture provides income and employment to the whole family including women, which is a household activity. Women contributes about more than 50 per cent of world population approximately 1/3rd of labourforce. Women contributed about 60 per cent to the sericulture workforce (Central Silk Board, Benguluru, 2022). Though,sericulture has an advantages but there is still a gap existed between expected and obtained yield of cocoon production. It might be due certain

unforeseen changes that observed during rearing of silkworm or mulberry cultivation. Some of the constraints which are experienced by the sericulture producers forces the silkworm rearers in lower adoption of sericulture enterprise which ultimately results in getting the lower yield of cocoon production. Among the constraints, high input cost is the key constraints followed by lack of irrigation facilities found in the non-adoption of mulberry sericulture (Shukla, 2011). The constraint encountered by the sericulture growers were shortage of irrigation water, lack of labours, insufficiency of capital high cost of chemical fertilizer, lack of knowledge about of bio-fertilizers, lack of information about application of VAM, lack of information about concentration of the bed disinfectant and rearing house disinfectant in the sericulture enterprise (Todmal*et. al.*, 2013). To comprehensively address challenges related to both pre-cocoon and post-cocoon activities, this study has been initiated. With a focus on various aspects, the objective of this investigation is to examine the constraints affecting the adoption of sericulture production.

Methodology:

Multistage sampling design was adopted in selection of district, tehsils, villages and ultimate sericulture growers.The study area pertains to Marathwada region of Maharashtra state. In the first stage, three districts viz., Beed, Parbhani and Jalna were purposively selected on the basis of availability of area under Sericulture production from the Marathwada region.On the basis of area under sericulture production, tehsils were purposively selected for the present study.In second stage, two tehsils of each selected districts were selected i.e. from Beed :Dharur and Beed, from Parbhani : Manvat and Purna and from Jalna : Ghansavangi and Jalna. Thus, total six tehsils were selected based on large number of sericulture growers.The random selection method was adopted in selection of villages. In the third stage from each selected Tehsils, four villages were selected randomly, on the basis of highest area under sericulture production. Sericulture growers were selected by using random selection method. In the fourth stage 10 sericulture growers were randomly selected from each selected villages. Thus from 24 villages, 240 growers were selected. The study was based on the primary data. Primary

data required for the present study were collected with the help of pre tested and well-structured schedule with an intensive visits at farm level through personal interviews. The data were collected during the period 2022-2023. Garretts ranking technique was employed to study the constraints in adoption of sericulture production.

Garrett's ranking technique:

Garrett's ranking technique was employed as a methodological approach to delve into the perspectives of farmers concerning the principal constraints encountered by sericulture growers. Following the identification of these constraints within the sericulture sector, respondents were actively involved in the ranking process. Each factor was assigned a rank by the respondents, and the resulting rankings were then translated into numerical scores utilizing a prescribed formula as follows:

$$\text{Percent Position} = \frac{100(R_{ij} - 0.5)}{N_j}$$

Where,

R_{ij} = Rank given for the ith variable by jth respondents and

N_j = Number of variables ranked by j^{th} respondents

The percentage position is translated into scores using the table provided by Garrett and Woodworth (1969). Subsequently, for each factor, individual scores are aggregated, and both the total score and mean score values are computed. The mean scores for all factors are then arranged in descending order, facilitating the identification of the most influential factors based on the assigned ranks. The factor with the highest mean value is considered the most significant in the analysis.

Results and Discussion

The cultivation of mulberry and cocoon production unveils a spectrum of challenges, prompting a meticulous examination of the prevalent constraints. To unravel the primary impediments hindering the sericulture enterprise, the Garret ranking technique emerged as the chosen analytical approach in this study. By engaging this method, we aimed to discern and prioritize the challenges faced by sericulture growers, shedding light on the factors that significantly impact the adoption of sericulture

production. A key aspect of this investigation involved categorizing all reported constraints from selected farmers into distinct types. This categorization revealed four overarching constraint categories: economic, technical, marketing, and supply constraints. Each category represents a cluster of challenges with unique characteristics, contributing to the overall intricacies of sericulture cultivation. The culmination of this effort is reflected in the presentation of findings through Garret's ranking method, as delineated in Table 1, 2, 3, and 4. This comprehensive tabulation not only provides a systematic overview of the constraints but also offers a nuanced understanding of their relative importance as perceived by the sericulture community in the study area. Such insights are invaluable for stakeholders, researchers, and policymakers, as they facilitate targeted interventions and strategic initiatives to alleviate specific challenges and foster sustainable growth in the sericulture sector.

Economic constraints faced by Sericulture growers

Economic constraints faced by sericulture growers encompass various financial challenges that impact the sustainability and profitability of sericulture enterprises. These constraints pose hurdles in managing costs, securing investments, and maximizing returns. The various economic constraints which are faced by the sericulture growers are presented in Table 1.

Table 1. : Economic constraints faced by Sericulture growers (n=240)

Sr. No.	Economic constraints	Mean	Rank
1.	High labour charges	53.07	II
2.	Insufficient capital	45.95	V
3.	High cost of Inputs (FYM, Planting material, chemical fertilizers)	53.70	I
4.	High initial establishment cost	46.80	IV
5.	Timely unavailability of loans from banks	49.48	III

It is evident from the table that, in an economic constraints, high cost of inputs (FYM, Planting material, chemical fertilizers) was observed as the major constraints which ranks I among all the economic constraints having mean 53.70. In process of production unavailability of inputs like, FYM, planting material, chemical fertilizers etc., at reasonable prices becomes a problem in production. Due to scarcity of some inputs leads to increase in market price during production due to which farmers do not follow the scientific method of recommended dose which resulted into farmers are not getting quality yield of the produce. This result is in similar with finding of singhvi*et.al.* (1994), Shukla (2011), Sharma and Yadaw (2013), andsiddiq*et. al.* (2015)followed by high labour charges with mean value 53.07 ranked II. The high labour charges is may be due to in rearing of silkworm skilled labours are required at workplace viz., in chopping of leaves to feed the silkworm in which the size of leaves is depends on the growth stages of silkworm, in harvesting of cocoons as the silk of cocoons is very sensitive, delicate in nature so there may be loss in handling of cocoons during harvesting of cocooons etc. This finding is in line with Suriyanarayanan and Tamilselvi (2007),Todmal*et. al.* (2013) and Sharma and Yadaw (2013).

Another important constraint is the timely unavailability of loans from bankswhich ranks III with mean value 49.48. This is may be due to there is huge amount of paper work and difficult procedure in availing the bank loan as well as subsidy that's why farmers are unable to get the required loan on time,during which farmers fails to attend his quality time of production.For proper management and care of silkworm requires enough money to maintain it. This finding is more or less similar in with findings of Sharma and Yadaw(2013) and siddiq*et.al.*(2015).

The fourth and fifth important constraints is high initial establishment cost and insufficient capital observed having mean value 46.80 and 45.95, respectively.During the initial days farmers require large amount of money in establishing the shed as well as purchasing the required rearing equipments like rearing trays, shoot rearing rack, chandrikasetc, and farmers have not the enough capital to invest in an enterprise. The constraints, shortage of capital or institutional credit are also reported by the results of siddiq*et.al.* (2015)

Technical constraints faced by Sericulture growers

Technical constraints encountered by sericulture growers involves challenges related to the application of scientific knowledge and technology in various stages of sericulture production. These constraints impact the efficiency, productivity, and overall success of sericulture enterprises.The technical constraints which are experienced by the sericulture growers are presented in Table 2.

Table 2. Technical constraints faced by Sericulture growers (n=240)

Sr. No.	Technical constraints	Mean	Rank
1.	Lack of knowledge about disease control in mulberry	51.71	II
2.	Lack of information about Uzi fly control	54.44	I
3.	Lack of Training facility to the sericulture growers	50.65	III
4.	Lack of information about concentration of the disinfectant	41.98	V
5.	Lack of knowledge about of bio-fertilizers	50.22	IV

In the technical constraints, lack of information about uzi fly control was observed as the key constraints and ranks first with mean value 54.44 as compared to remaining constraints followed by lack of knowledge about disease control in mulberry with mean value 51.71 ranked II, This might be due to the unawareness of control measures in uzi fly or lack of extension programme in dissemination of information regarding the control measures of uzi fly attack as well as preventive measures of disease control.The finding of the study is in conformity with the Todmal (2013).

Third important constraints is the lack of training facility to the sericulture growers with mean value 50.65. In sericulture, in silkworm rearing, Skill is the significant factor that must be learnt by the farmers which can be only acquired by the farmer through experience or some sort of training given by some experienced farmer or government institute.The same result is also reported by Siddiq *et.al* (2015) and Shukla (2011).

Fourth and fifth significant constraints in technical constraints are lack of knowledge about of bio-fertilizers and lack of information about concentration of the disinfectant which has mean value 50.22, 41.98, respectively. In mulberry cultivation knowledge of selection and quantity of bio-fertilizer is very essential to obtain the quality leaves for feeding the silkworm and getting the quality cocoon production. One must need the understanding regarding the disinfectant in order to avoid the infection to silkworm. Ifdead or pest infected silkworms remains inside the raring trays, it infects the other silkworms badly and leads in degradation of quality of cocoons which yields the B-grade quality cocoons.The finding of the study is in similar with the finding of Suriyanarayanan and Tamilselvi (2007) and Hadimani *et. al.*(2019).

Marketing constraints faced by Sericulture growers:

Marketing constraints faced by sericulture growers encompass a range of challenges related to the promotion, sale, and distribution of silk and other sericulture products. These constraints significantly impact the economic viability and market competitiveness of sericulture enterprises. The various marketing constraints perceived by the sericulture growers are presented in Table 3.

Table 3.Marketing constraints faced by Sericulture growers (n=240)

Sr. No.	Marketing constraints	Mean	Rank
1	High transportation cost	49.53	III
2	High risk	47.17	V
3	Fluctuation in the cocoon prices	53.08	I
4	Lack of storage facilities	50.04	II
5	Markets are far away from sericulture units	49.18	IV

In regard to marketing constraints, fluctuation in the cocoon prices is considered as the prominent constraint which ranked first and having mean value 53.08.The domestic price of cocoon is solely depends on the quality of cocoons. Feeding of quality mulberry leaves to silkworm contributes more than 50 per cent in the cocoon production.

Maintenance of temperature and humidity, disinfectant, proper schedule of feeding to silkworm are required in order to get the quality cocoons. The low quality cocoons leads to fluctuation in domesticprice of cocoons. This conclusion of the study is in relevance with the findings ofSharma and Yadaw (2013), Suriyanarayanan and G. Tamilselvi (2007).

The third constraint i.e. the lack of storage facilities with mean value 50.04 ranked II in the marketing constraints faced by silkworm growers. The unavailability of protected storage facilities i.e. storage houses leads to loss of cocoons by attack of insects and pests during storage which results in difficulty in grading resulting low quality of cocoons. In Covid-19 times there was major problem occurs in the storage of cocoons due to which farmers faced a lot of problems which becomes the reason in quitting the sericulture enterprise by majority of the farmers in rural areas. Wazoor of Parbhani district is one of the example found in the study area.The conclusion of the study is in line with the findings of Hatibaruah (2021) and Gaikwad *et.al*.(2023).

Another important constraints encountered by the silkworm rearers are high transportation cost, markets are far away from sericulture units and high risk that having mean value 49.53, 49.18, 47.17, respectively. The high transportation cost is due to bad condition of road which is major problem found with the farmers living in farms in the rural areas. In order to fetch the good price for their produce farmers are went to the Ramnagar, Banglore Cocoon market which is far from their silkworm rearing unit. In rearing of silkworms, they are very delicate in nature, sudden fluctuation in temperature may fails the whole batch in obtaining the quality cocoons and climate change is another important aspect need to be taken into account in getting quality of coccons. Thus, it involves high risk in sericulture. Therefore, knowlede regarding regulation of temperature and humidity is required. The similar results with respect to high transportation cost, markets are far away from sericulture unit are also reported by Sharma and Yadaw (2013),Suriyanarayanan and G. Tamilselvi (2007) andHatibaruah (2021).

Supply constraints faced by Sericulture growers:

Supply constraints encountered by sericulture growers involve a range of challenges associated with the availability and accessibility of crucial resources necessary

for successful sericulture operations. These constraints are integral components that impact the overall efficiency and productivity of sericulture practices. A comprehensive understanding of these challenges is presented in Table 4, highlighting the multifaceted nature of supply-related hurdles in the sericulture sector.

Table 4. Supply constraints faced by Sericulture growers (n=240)

Sr. No.	Supply constraints	Mean	Rank
1	Scarcity of labours	50.13	III
2	Lack of trustworthy DFL sources	51.76	II
3	Timely unavailability of fertilizers and other chemicals	48.99	IV
4	Insufficient FYM at disposal	53.55	I
5	Shortage of irrigation water in the summer season	44.57	V

In the supply constraints, insufficient FYM at disposal was observed as most important constraints as compared to other constraints having mean value 53.55 and ranked first. This is may be due to the fact that now a days, for earning the fixed income most of the people are migrated towards the urban area that is away from the agricultural background and ultimately it also affects on agriculture and it's allied fields and thus, due to unavailability of fodder the farmers are not rearing the cattles as result their population become less in number which leads to less production of FYM. The finding of the study is in relevance with finding of Siddiq *et. al.* (2015) and Todmal (2013).

Second most important constraint observed in a study area is lack of trustworthy DFL sources with mean value 51.76 ranked II, for getting the quality silk, quality cocoons contributes a major role which can be only possible by providing a sources of trustworthy disease free layings to the farmers. The result is also in similar with result of Siddiq *et. al.*(2015) and Todmal (2013).

Scarcity of labours and timely unavailability of fertilizers and other chemicals having mean value 50.13 and 48.99, respectively were also considered as an important supply constraint faced by the sericulturist. Being an agro-cottage and labour intensive

industry sericulture involves both the on-farm as well as well as off-farm activities. It requires skilled labours during rearing of silkworm for many practices right from the harvesting of mulberry leaves, chopping and feeding of leaves to silkworms, bed cleaning, etc., upto the harvesting of cocoons. Due to less availability of skilled or trained labour, there may be the scarcity of labour occurs.Sharma and Yadaw(2013), Elumalai and Murugesh **(2019)** and Hatibaruah (2021). Timely unavailability of fertilizers and other chemicals may yields low quality of leaf yield which ultimately affects on the production of quality cocoon in sericulture. The same result finds support with the result of Todmal (2013).

The fifth important constraint i.e. Shortage of irrigation water in the summer season and having mean value 44.57. In summer season the farmers cannot take any production because of the lowering of level of groundwater and hence there is less availability of irrigation water to the plants which leads to lower mulberry leaves production. The same result is also reported by Suriyanarayanan and G. Tamilselvi (2007).

Conclusion:

In conclusion, the study identifies four primary constraints in the study area: economic, technical, marketing, and supply constraints. Notably, the high cost of inputs emerges as a major economic constraint, while a lack of information about uzi fly control tops the list in technical constraints. Fluctuations in cocoon prices stand out as a key challenge in marketing, and insufficient FYM availability is a crucial supply constraint. To address these issues, sericulture respondents suggest measures such as fair pricing for inputs, lower labour charges, ongoing awareness programs, training initiatives, and government intervention in market regulation. Additionally, the need for a long-term price policy and reliable sources for disease-free laying (Dfl) are emphasized for sustaining sericulture farmers.

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