ECONOMIC ANALYSIS OF SERICULTURE IN WASHIM DISTRICT

THESIS

Submitted to,
Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola
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(AGRICULTURE ECONOMICS)

By
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DECLARATION OF STUDENT

I hereby declare that the experimental work and its interpretation of the thesis entitled **"ECONOMIC ANALYSIS OF SERICULTURE IN WASHIM DISTRICT"** or part thereof has neither been submitted for any other degree or diploma of any University, nor the data have been derived from any thesis / publication of any University or Scientific Organization. The sources of material used and all assistance received during the course of investigation have been duly acknowledged.

Place: Akola
Date: / /2020

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CERTIFICATE

This is to certify that the thesis entitled **"ECONOMIC ANALYSIS OF SERICULTURE IN WASHIM DISTRICT"** submitted in partial fulfilment of the requirements for the degree of "**Master of Science in Agriculture (Agricultural Economics)"** of Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola is a record of bonafide research work carried out by **Waghmare Shrenee Siddharth** under my guidance and supervision.

The subject of thesis has been approved by the Student's Advisory Committee.

Place : Akola
Date : / /2020

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Place: Akola (Waghmare Shrenee Siddharth)

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(C) List of Abbreviations

DFL's	-	Disease free layers
^{o}C	-	Centigrade
et al.	-	et alia (and associates)
etc.	-	et cetra
ha.	-	Hectare
i.e.	-	that is
Km	-	Kilometer
Mm	-	Millimeter
Rs.	-	Rupees
Viz.	-	vize
CL	-	Cart load
Qtl.	-	Quintal
Kg.	-	Kilogram
@	-	at the rate

D) Thesis Abstract

a)	**Title of the thesis**	**:**	**ECONOMIC ANALYSIS OF SERICULTURE IN WASHIM DISTRICT**
b)	**Full name of student**	**:**	Waghmare Shrenee Siddharth
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ABSTRACT

The demand for silk and an employment potential of this viable agriculture activity, i.e. sericulture, this study “Economic analysis of sericulture in Washim district” was carried out. For this study, 60 farmers having mulberry plantation were selected from three tehsils of Washim district. The study was based on primary data and it was collected through specially designed questionnaires. The methodology used was of quantitative type. According to size of holding and DFLs capacity growers were classified as small, medium and large groups. The average gross cropped area of selected mulberry

farmers was 6.27ha out of which 13.39 per cent is under mulberry plantation, and the overall labour force involved for establishment of one hectare of mulberry garden is 112.68 labour days and 19.48 bullock labour days.

The establishment cost incurred on per hectare basis was maximum in large group, whereas maintenance cost of mulberry garden and expenditure required for rearing of silk cocoon were Rs. 125120, Rs. 160574 and Rs. 198717 in small, medium and large group respectively. In all 560.89 human labour days per hectare could be engaged in silk industry and produced a yield of 395.05 kg (small group), 489.50 kg (medium group) and 641.79 kg (large group) silk cocoons per hectare. The input output ratio was found to be maximum in large group as 2.21 at cost A and it further reduced to 1.41 at cost C_3.

From the above study it is concluded that rearing of silk cocoon in more than 0.40 hectare and above 200 DFLs was found highly profitable venture and having high potential for employment of human labour, i.e. 560.89 labour days per hectare during the year.

Sericulture is a profitable venture. Hence there is need to take initiatives to ensuring the fair prices to the silk cocoon rearers.

CHAPTER I

INTRODUCTION

1.1 Background Information

Silk is a way of life in India. Sericulture in India has proved to be an ideal avocation for inclusive development of rural populace especially the weaker sections of the society addressing equity distribution from urban rich to rural poor. Based on past favourable experiences and because of its potential for employment generation and improving rural income, both Government of India and other State Governments have been planning measures to expand silk production.

Sericulture is agro-based cottage industry, which is practiced pre-dominantly in the rural part of the country. Despite the popularity of various synthetic fabrics in recent year, silk continues to hold a unique place in textile world due to its aesthetic appeal, softness. Silk, a highly priced agricultural commodity, accounts for about 0.2 per cent of the total world production of the textile fibre. It is an effective tool for rural development as it generates income and employment, sericulture is now practiced in near about 50,000 villages of our country providing employment to about five humans per day.

Silk is often called “Queen of fibres.” It has number of characteristic features like fineness, lustrous look, resilience, good dye ability, high durability and draping quality. Also, it is one of the strongest fibres. Over the centuries, because of these unique features, silk has reigned undisputed as “Queen of textiles” in the world over. Silk has intermingled with the life and culture of the Indians. India has rich and complex history in silk production and its trade which date backs to 15th century.

Sericulture is a farm based, labour intensive and economic activity supporting farm families and cottage and small sector. Being one of the important sectors in Indian economy it checks poverty and migration. It involves series of activities like mulberry cultivation, cocoon production, silk reeling and the products in different forms. It is not only limited to the few

areas where it is been intensively practiced called traditional areas but also for non-traditional areas. Also, it is a short gestation period labour intensive enterprise which can go a long way in promoting inclusive growth and alleviating property in rural areas. Livelihood generation is one of the major potentials of sericulture and silk industry. Sericulture occupies the place of pride in the rural economy. It can be practiced even with very low land holding. Low gestation, high returns make sericulture an ideal programme for weaker section of the society. In view of this, it is very much imperative to know the sericulture economics in order to motivate new farmers to take up sericulture and increase their income.

Silk production has achieved remarkable growth during recent times. Silk production increased from 23,060 MT in 2011-12 to 31,906 MT in 2017-18 at a compound growth rate of 5.1 per cent per annum. Country's raw silk production is expected to reach 38,500 MT by 2019-20 and become self-reliant by 2022.

Today India is the second largest producer of silk in the world, after China and provides employment to over 8.5 million people in the entire silk production value chain from farm to fabric. 35468 MT is the total raw silk production in 2018-19 increased by 10.52 per cent over the previous year 2017-18 (31906 MT). Among the four varieties of silk produced in 2018-19, Mulberry accounts for 71.50 per cent, Tasar 8.44 per cent, Eri 19.40 per cent, and Muga 0.66 per cent. (Central Silk Board, Bengaluru). India's export earnings from silk during the year 2017-18 was Rs.1649.48 crore (US$ 255.93 million). The UAE, the USA and the UK are the major importers of Indian silk goods. (Annual report 2017-18, Central Silk Board, Bengaluru). Karnataka ranks first in producing silk in India followed by Andhra Pradesh, Assam and West Bengal etc. (Seri-States of India 2019: A profile).

On the other hand, the employment generation through sericulture in the country is raised to 8.60 million persons in the year 2017-18 compared to 8.51 million persons in the year 2016-17, indicating the growth by 1.06%. Silk stands for livelihood opportunity of millions, owing to its high employment potential, low capital requirement and remunerative nature of its

production. The very nature of this industry with its rural based on-farm and off-farm activities and enormous employment generation potential has attracted the attention of the planners and policy makers to recognize the industry among one of the most appropriate avenues for socio-economic development of a largely agrarian economy of India.

In reality, it is an occupation by women and for women because from more than 60 per cent of the workforce and 80 per cent of silk is consumed by them. The nature of work involved in the sericulture industry such as harvesting of leaves, rearing of silkworm, spinning or reeling of silk yarn and weaving are carried out by women.

Maharashtra is a non-traditional sericulture state which produces both mulberry and tasar silks. The speciality of the state is that, it undertakes 98 per cent of bivoltine sericulture. It occupies the top position in terms of quantity in silk production among non-traditional states and enjoys 13th rank among the silk producing states. About 9955 farmers are involved in silk production with mulberry plantation in about 10816 acres of land. Similarly, 3000 farmers are involved in tasar plantation covering 10669 hectares. In 2017-18, farmers produced 2280 MT of mulberry cocoons to produce 350 MT of raw silk; while, the tasar farmers reared 354 lakh numbers of tasar cocoons, out of which 19.33 MT of tasar raw silk was produced. Thus, sericulture provides good employment opportunities for farmers in the state. Tasar silk is grown in four districts of Vidarbha region namely Gondia, Gadchiroli, Bhandara and Chandrapur whereas, all others are mulberry silk producing districts.

Silk Samagra, a comprehensive central sector scheme of Central Silk Board is under implementation from the year 2017-18 to 2019-20, for overall development of sericulture industry in the country, implemented directly as well as through state governments. The programme catalyses the efforts of state governments to improve the quality, productivity and production of raw silk besides, generating employment opportunities particularly in rural areas. During 2018-19, under Tribal Sub-Plan, Silk

Samagra fund has been released to Directorate of Sericulture, Maharashtra amounting Rs.0.9819 crore.

Progress of Indian raw silk production from I to VII Plan

During the I Plan period; silk production rose from 1,211 MT in 1950 to 1,421 MT in 1955-56 registering an increase of 17 per cent. Further rise of 5% in the production was witnessed during the II Plan. The output by the end of II Plan (196061) stood at 1,499 MT. During the III Plan (1965-66), the silk production was 2,152 MT at this time, India ranked fourth among the silk producing countries of the world. The rise in the production was 44 per cent over the II Plan. The same trend continued up to V Plan taking the raw silk production to 3,711 MT with an increase of 28 per cent over the IV Plan. Raw silk production in the country began making significant progress during the VI Plan and by the end of VI Plan period (1984-85) the production reached 7,673 MT with an outstanding increase of 107 per cent over the V Plan. Similarly, the raw silk production reached 12,016 MT by the end of VII Plan (1989-90) with an increase of 57 per cent over the VI Plan period.

Progress of Indian raw silk production from VIII to XII Plan (2016-17)

Country's raw silk production has grown from 23,060 MT during the year 2011-12 (end of XI Plan) to 30,348 MT in 2016-17 (end of XII Plan) at a Compound Annual Growth Rate (CAGR) of 5.1 per cent per annum. The bivoltine silk (import-substitute) production recorded a compound growth of 25.6 per cent per annum. Similarly, the non-mulberry silks, collectively called as vanya silk, have achieved a compound growth rate of 13.6 per cent during the same period. The import of raw silk has consistently reduced from 5,683 MT in the year 2011-12 to 3,795 MT on the year 2016-17 due to increase in import substitute bivoltine raw silk production in the country.

Progress of Indian raw silk production from 2017-18

The country has produced a record level of 31,906 MT of raw silk during the year 2017-18. During the same year, import substitute (bivoltine) raw silk production has recorded 11.5 per cent growth over the previous year (2016-17) -indicating the intense interest of farmers in

producing bivoltine rather cross breed cocoons, through good performance of the industry. A significant increase of 8.4 per cent in vanya silk production during 2017-18 was witnessed over the previous year (2016-17) due to the implementation of North-East Region Textile Promotion Scheme (NERTPS), a focused umbrella scheme for NE States. While in the year 2018-19 the country has produced 35468 MT of raw silk.

1.2 Scope and Importance

As compared to other agricultural crops and rural based industries, sericulture needs little investment for maintenance of mulberry garden and silkworm rearing once the mulberry garden is established. And as sericulture enterprise is expected to increase employment and income with little investment for mulberry cultivation and silkworm rearing when compared to other agricultural crops and rural based industry. Therefore, the present study is an attempt to analyse the cost structure, income, employment generation and problems of farmers in Washim district.

1.3 Objectives

Keeping in view the above, the importance of sericulture enterprise, the study was conducted with the following objectives:

1. To estimate the cost and returns of sericulture.
2. To examine the employment generation from sericulture.
3. To study the constraints faced by sericulture growers.

1.4 Hypothesis

Sericulture is a profitable venture.

1.5 Limitations

The results of study based on data collected for one year. Due to limitation of time and other reason the study is restricted to Washim district. Generalization of result was not possible for all farmers in the area. The primary data were collected by interviewing farmers. Finding of the study was based on responses of the respondent and hence the objectivity is limited to the honesty and memory power of respondents.

CHAPTER II

REVIEW OF LITERATURE

Review of literature related to research topic is a necessary step in the conduct of any scientific research. The researcher would be able to expand the horizon of investigation on the subject matter and also helps for undertaking the research in the proper direction. Hence, an effort is made in this chapter to review the related reviews brief. The literature pertaining to sericulture is grouped under following headings

1. Production, cost and returns in sericulture
2. Employment generation in sericulture
3. Constraints faced by sericulturist

2.1 Production, cost and returns in sericulture

Deshpande (1988) studied the economics of sericulture in Akola district of Maharashtra. The per hectare cost of silkworm rearing was Rs. 1823.58, Rs. 4982.00 and Rs. 7220.92 in small, medium and large group respectively. The yield of cocoon was observed 50.66 kg, 157.44 kg and 230.55 kg in small, medium and large group respectively which results net return of Rs. 831.02, Rs. 2185.09 and Rs. 3468.51 per hectare in small, medium and large group respectively.

Kerutagi et al. (1993) studied the economics of mulberry cultivation in Bijapur district of Karnataka where they worked out the costs and returns from mulberry cultivation. Field data for the year 1980-90 were collected from randomly selected sericulturists (66) spread over five villages in Jamkhandi taluka through survey method. Net profit obtained from mulberry crop was Rs. 14.127 ha/year and returns per rupee of investment was Rs. 1.78 indicating a net profit of 78 paise for every rupee invested.

Srinivasa et al. (2001) reported that the total cost of production of cocoons was Rs. 32786.75, Rs. 37427.46 and Rs. 34638.31 for bivoltine, multivoltine rearers and the overall category respectively, in their study on cropping patterns and income levels of sericulturists in Mandya district of

Karnataka. The net returns for the three categories were found to be Rs. 15756.86, Rs. 200516 and Rs. 18235.24, respectively. The net returns were low in case of the bivoltine rearers compared to the multivoltine rearers as the bivoltine race (CSR) was reared only from September-February in which only 3 crops could be harvested as compared to 5 crops of multivoltine.

Gururaj et al. (2007) reported in their study on sericulture at Kodagapura; a case study that the sericulturists who switched over to PM – CSR2 (as it was better yielder hence, more remunerative) in Kodagapura village recorded a cocoon yield of 52.22 kg/100dfls and showed an improvement of 10kg (26.3%) over the bench mark cocoon yield of 41.32 kg/100dfls and earned better returns of Rs. 1800-2500/100dfls after launch of Institute Village Linked Programme in the year 2004-05.

Purushotham and Rao (2009) studied economics of sericulturein Ananthapur district of Andhra Pradesh with a total sample size of 120 sericulture farmers and revealed that, the net returns from one acre of mulberry were Rs. 52206 per year. The cost benefit ratio of sericulture was worked out to 1:1:94. Total cost of mulberry production from one acre of land was Rs. 22536.50. The cost of cocoon production per annum was worked out to Rs. 32770.20 thus the total cost (mulberry cultivation + rearing) was worked out to Rs. 55306.50. Gross income from cocoon production was Rs. 107513 and net returns of Rs. 52206.50. The major economic factor contributing total cost in structure was labour i.e with 32.54 per cent for silkworm rearing and 13.95 per cent for mulberry production. Another important item of cost was equipment for silkworm rearing which was 11.27 per cent to the total cost.

Borker (2010) studied the economics of sericulture in Nagpur district of Maharashtra. The per hectare yield of cocoon was 304.47 kg, 591.79 kg and 643.8 kg in small, medium and large group respectively. The per hectare cost and return for rearing of silk cocoon indicated that on an average Rs. 117709.29 were obtained as gross receipts considering main product and by product leaving behind Rs. 35553.81, Rs. 24900.49 and Rs. 13828.63 at cost A, B and C respectively.

Mote et al. (2013) analysed the cost and returns from silk cocoon production in Marathwada region of Maharashtra. The data collected using multistage simple random sampling revealed that the average cost of silk cocoon production varied as per farm size group. It was high Rs. 97,029 in farm size group I (<0.40ha.) followed by Rs. 86,882 in farm size group II (0.41-0.80ha.) and Rs. 77,129 in farm size group III (>0.80ha.). The average returns per hectare for different farm size group has been Rs. 1,21,782, Rs. 1,08,937 and Rs. 94,557 for the Group I, II and III respectively. The net returns for the different farm size groups were Rs. 24,753, Rs. 22,055 and Rs. 20,431 for the group I, II, and III respectively. This has indicated that the sericulture activity is quite profitable in all the farm size groups of the farmers.

Amarnath and Karthik (2014) conducted the study on economic analysis of sericulture enterprise in Dharmapuri district in Tamil Nadu. The results of the study indicated that the total cost incurred per hectare of sericulture enterprise was Rs. 279585.80. The average gross income per hectare was Rs. 332168.80 and net income was Rs. 52583. The net present worth of the project including labours employed was Rs. 606990.70, the estimated benefit cost ratio of 1.37 and IRR was more than 60 which indicated its economics efficiency.

Sharma et al. (2019) analysed the investment and returns pattern of cocoon production in Bilaspur district of Himachal Pradesh. Out of 60 silkworm rearers, 19 were large and 41 were small. The dry cocoon production per farm on small and large category was estimated at 8.25kg (6.20kg in spring and 2.05 kg in autumn) and 19.51 kg (16.67 kg in spring and 2.84 kg in autumn). The dry cocoon production per ounce of seed was found to be 20.28 kg and 26.14 kg on small and large category households for both the seasons together. The fixed cost of production/ounce for spring crop varied from 9.92 per cent on small farms to 14.75 per cent on large farms. The variable cost varied from 90.08 per cent on small farms to 85.25 per cent on large farms. The gross returns per ounce seed basis ranged between Rs. 1626 and Rs. 5535 on small and large farms for the spring crop. The autumn crop was found to give negative returns.

2.2 Employment generation

Utpal and Manjit (2010) made a comparative assessment of different silk cultures in Assam, namely, eri, muga and mulberry as a source of employment and income. Generation of revenue and gross profit over paid-out (explicit) cost per unit of eri cocoon production is the highest in comparison to muga and mulberry, whereas paid-out (explicit) cost per unit of cocoon production is the lowest in case of eri and highest for muga. Finally, the quantity of cocoon production from the plantation of unit area is much higher in case of eri than that of muga and mulberry. Among all varieties of sericulture activities in Assam, these poor people are more benefitted in terms of employment and income from sericulture that has more market potential as it is comparatively cheaper.

Ruchira (2012) conducted a study with the help of personal interview of 70 rainfed sericulture farmers in Udaipur district of Rajasthan, India in order to motivate new farmers to take up sericulture and increase their income. The study concluded that in garden establishment, the highest share of cost was associated with hum labour (INR 14,400.00) followed by that for FYM (INR 2418.75). Similarly, human labour (51.93%) accounted for highest element of cost in leaf production activities too owing to high labour wages and shortage of manpower. Labour (25.33%) was second major cost component next to mulberry leaf (38.64%) in silk cocoon production. The average yield of silk cocoon obtained was 1289.04 kg/ha per year. The net return obtained was INR 52039.32 and benefit cost ratio were 1.49.

Siddappaji et al. (2014) analysed the socio-economic development through sericulture in Karnataka along with world and India. It mainly focused on sericulture as eco-friendly, helps to soil conservation and foreign exchange earning opportunity for the developing countries. About 12000 to 15000 investment is enough for undertaking mulberry cultivation and silkworm rearing in one acre of irrigated land. By adopting stipulated package of practice, a farmer can get up to Rs. 30000 per acre per annum. It creates more than 60 per cent of people engaged in own activities in sericulture.

Roy and Mukherjee (2015) made an analytical study on determinants of income generation in rural sericulture sector of West Bengal. It focused on land productivity and technical efficiency of marginal classes and will measure their impact on income generation in the sericulture. With the help of secondary data, they analysed the income trends from raw silk at national and state level whereas for primary survey four sericulture rich villages in Malda district were chosen, where 60 silk-artisan households were selected using stratified random sampling. Simple linear regression technique has been used using OLS method to estimate statistical models based on apriori hypothesis. Secondary data shows the area of mulberry cultivation and price of reeling cocoons are significant determinants in generating income. However, primary data analysis collected from Malda district exposes that man days creation for this avocation and technical efficiency are significantly influencing income generation in rural sericulture while cost of implants has a serious detrimental impact on revenue generation by silk artisans.

Roy and Sarkar (2015) have investigated the rate of work participation between men and women in different age groups and earning from sericulture as a livelihood in the Alomtola village of Kaliachak-II Block of Malda District. Collected data has been analysed using standard statistical methods and final conclusion was drawn based on it. Over all work participation rate in sericulture by male workers is 76.15 per cent while the female workers are 84.51 per cent. Exceptionally difference between male and female participation in the age group below 14 years is higher (26.22%) than the any other age groups. But the difference in participation rate between male and female is below 20 in all the age group of 14-19, 19-30 and above 30 years. In case of income generation from sericulture production, most of the households earn Rs. 5000 to Rs. 15,000 in particular season leading to an annular income of Rs. 20000 to Rs. 60000.

Subrata Trivedi and Sarkar (2015) made a comparative analysis on the income generation through agriculture crop and sericulture at farmer's level in Murshidabad district. The study clearly indicates the sericulture is capable of generating more income than paddy, wheat, etc because

sericulture can be practiced 4-5 times in a year. The combined net income from the multiple farming system in a year is Rs. 42,500 (Paddy in summer and paddy in rainy season and mustard each amounting Rs.13,000+ 18,580 + 10,640 = Rs.42,500) which is still less than sericulture which generate Rs.52,900 in one acre of land for irrigated condition.

Bharathi (2016) stated that India has distinct advantage of practicing sericulture all through the year, yielding a stream of about 4-6 crops as a result of its tropical climate. Sericulture is practiced in about 52,360 villages all over the country and employment to about 7.56 million people, most of them being small and marginal farmers in rural areas creating employment to atleast 12-13 people per hectare of mulberry. Sericulturists can find employment as officers, managers in the agricultural loan sector of nationalised as well as private banks. They can work as a manager in Sericulture farm, grainage, silk reeling, silk weaving mill, etc. as well as in various central government sponsored schemes.

Dewangan (2017) surveyed 100 farmers and studied the income and employment generation through sericulture in Dharamjaigarh block in Chhattisgarh. The number of cocoon produced are 6350/crop/beneficiaries. The economic gain by the respondent in Rs. 5160. The yearly production of cocoons by the respondents in 18900 numbers. The total average monthly income is Rs. 3770. 26% respondents received employment for 100-150 days and 74% received 151-200 days.

Dewangan (2018) studied the economics of sericulture in Raigarh district of Chhattisgarh to show it generates high employment and income per unit of land area being a labour-intensive venture. The number of cocoon produced are 7750/crop/beneficiaries in Tamnar and in Gharghoda it is 7500 and in Kharasia it is 7800. The economic gain by the respondent of Tamnar is Rs. 5760 and in Gharghoda and Kharasia it is Rs. 5960. The data indicated that total average monthly income from sericulture is Rs. 3540, Rs. 3670, Rs. 3660 in Tamnar, Ghargoda and Kharasia respectively. It concluded that conservation of environment, no cutting and felling of trees, generation of local employments are the impacts of sericulture attributed by all the

respondents. Also, it can serve better for the additional income generation as the work is simple and can be done without any cost paving the way for local employment generation. It has been estimated that the annual income of respondent rose up to an average of Rs. 23650, Rs. 18150, Rs.18850 in Tamnar, Ghargoda and Kharasia places respectively.

2.3 Constraints faced by Sericulturist

Dodamani et al. (1997) in their study on problems of sericulture enterprises in Gulbarga district, Karnataka conducted a survey in five villages in Jewargi taluka of Gulbarga district and identified the constraints in mulberry cultivation and silk ccoon production. The results indicated that incidence of pest and diseases as well as shortage of irrigation water were the major problems in mulberry cultivation in the study area. The other problems like non-availability of separate rearing rooms, shortage of rearing equipment and mortality of laying and lack of availability of disease free laying were the problems faced by the farmers in silk cocoon production.

Satyabhan et al. (2000) conducted a survey in Dehradun area and stated that from few years sericulturist was facing problems about sale of cocoon. Main reason was no proper market channel like Karnataka was present there in Dehradun, also number of rearer are less. Farmers are also not aware that how to estimate effective price of their produce so that they can achieve a better price for their produce. The produce of farmers were not sold out quickly due to which interest of farmer was decreasing day by day.

Rao et al. (2001) in their study on comparative economics of cocoon production in coastal area and traditional areas of Andhra Pradesh showed that the cost of cocoon production was evaluated to be Rs. 24106.31 and Rs. 26810.03 in Chittoor (tradtional area) and Eluru (costal area) areas, respectively. The average yield obtained by Chittoor farmers was higher (42.99 kg/100dfls) than that of Eluru farmers (38.50 kg/100dfls). The Eluru farmers realized a lower average price for cocoon (Rs. 98.75/kg) compared to Chittoor farmers (Rs. 106.50/kg) due to non-availability of marketing facilities in that area which in turn caused deterioration of cocoon quality due to long distance transportation for marketing.

Dhande et al. (2004) assessed constraints faced by the farmers in mulberry cultivation and silkworm rearing. They observed constraints in mulberry cultivation such as high labour wages, inadequate labour, inadequate irrigation facilities, high cost of manure and fertilizers, lack of guidance and lack of knowledge about mulberry diseases and pests, high cost of rearing room and equipments, lack of credit and subsidy, lack of manpower, difficulty in rearing silkworm diseases.

Yadav (2008) in their study on yield gaps and constraints in cocoon production in Karnataka revealed that the major constraints in cocoon production were attack of pests and diseases, high wage rates of labour, inadequate technical guidance from extension personnel, improper disinfection of rearing house and rearing equipments.

Ruchira Shukla (2011) conducted a survey to know the constraints in adoption of recommended technologies in mulberry sericulture using personal interview methods in two tehsils of Udaipur district of Rajasthan. It was found that among the constraints expressed by the farmers of mulberry sericulture, high input cost ranked first followed by lack of irrigation facilities whereas the constraint ‘scattered field’ was ranked as last according to the responses obtained from mulberry sericulturists.

CHAPTER III

METHODOLOGY

The chapter deals with the sampling techniques, methods of collection of data and tools used in the analysis of data which forms a basis for any scientific study to arrive at the final conclusions.

3.1 Sampling techniques

3.1.1 Selection of area

The present study was undertaken in Washim district of Vidarbha region. The district was selected purposively**.** The data pertained for the year 2019-20.

3.1.2 Selection of the tehsils

Out of six tahsils, three tehsils namely Washim, Malegaon and Risod were selected purposively based on the maximum area under silviculture.

3.1.3 Selection of villages

List of sericulture farmers villages were obtained from Taluka Agriculture Office and KVK of the selected tahsils and three villages from each tahsil were selected purposively. Thus, total sample of 60 farmers were selected.

3.1.4 Selection of farmers

The common list of mulberry growers of selected villages was prepared. The mulberry growers were classified into two categories, i.e. those having one year old mulberry garden were considered for study of establishment cost and those having second year of their mulberry garden were considered for study of commercial production of mulberry leaves for feeding to larvae.

Table 3.1 Tehsil-wise distribution of selected farmers

Sr. no.	Tahsil	No. of selected farmers
1	Washim	20
2	Risod	20
3	Malegaon	20

These selected mulberry growers were further grouped in three types according to area of mulberry garden held by them and their rearing capacity.

Table 3.2 Area-wise and DFL's-wise categorization of selected mulberry famers

No. of farmers	Groups	Area under mulberry garden with rearing capacity (DFL's layer)
20	I (Small)	Below 0.40 ha and upto 100 DFLs capacity
20	II (Medium)	Above 0.40 upto 0.80 ha and above 100-200 DFLs capacity
20	III (Large)	Above 0.80 ha and above 201 DFLs capacity

3.2 Collection of data

The selected farmers were personally interviewed and required data were collected from them by the survey method through a specially designed pre-tested schedule. Information pertaining to input structure, expenditure and field were collected for the year 2019-20. This includes the information of land, area under irrigation, farm assets, cropping pattern, family member, etc.

The input-output data includes the data on the quantity of inputs namely human labour, cuttings, fertilizers, plant protection, FYM. Also, the data on the field of cocoon as main produce and quantity of by-produce like manure, firewood and mulberry cuttings were included and these inputs were assessed in physical term and were converted in monetary units by applying

respective existing prices, and marketing includes the data of the prices at which the farmer sold their produce.

3.3 Estimation of cost

Cost of silkworm comprises following items

3.3.1 Establishment cost of mulberry garden

This refers to the cost involved in establishing mulberry garden. It includes expenditure on different inputs used during establishment period of garden. The average period required for the establishment of mulberry garden is 6 months. The cost involved during this period was therefore taken as the establishment cost. The total establishment cost (Cost C) was spreaded over the lifespan of the mulberry garden which was estimated as 15 years.

3.3.2 Maintenance cost of mulberry garden

It includes the expenditure incurred on the inputs used for the maintenance of mulberry garden. Maintenance cost starts after the establishment of mulberry garden i.e. after six months.

3.3.3 Silkworm rearing cost

It includes the cost of different inputs used in rearing of silkworm. Data on the inputs used and the cost involved for each of the above activities were collected and analysed.

3.3.4 Hired human labour

The casual labor was evaluated on the basis of actual wages paid to the permanent farm labour as a matter of fact, the basis of yearly wages paid to him in the form of cash and kind and actual days of work performed by him. However, for detail data the permanent labour was evaluated on the basis of prevailing wage rates in the locality. The male and female labours were evaluated separately.

3.3.5 Bullock Labour

Realistic approach for estimation of bullock pair labour charges consist of estimating the expenditure of maintenance of bullock and income received from hiring out the bullock pair and from manure. However, in the

absence of realistic data on the maintenance of bullock pair, it had not been possible to estimate the bullock pair labour charges on the basis of approach put lined above therefore, the bullock pair hiring rates prevailing in the locality for various operations were considered for evaluating bullock pair labour changed.

3.3.6 Manure and fertilizers

Manure and fertilizers were purchased from outside and evaluated on the basis of actual price paid by the farmers. The home produced mature was evaluated at the price prevalent in locality.

3.3.7 Mulberry cutting

Mulberry cutting used for plantation purpose were provided by the district sericulture office, free of cost prevailing charges i.e. Rs.100 per 1000 cutting were included in the cost.

3.3.8 DFL's (Disease free layers)

DFL's rate was obtained from the taluk agriculture office. Per DFL rate offered @ Rs. per DFL's, hence included in the total cost accordingly.

3.3.9 Disinfectant

Disinfectants are used to keep the silkworm free from disease. This item was evaluated on the basis of actual quantity of material used and labour involved.

3.3.10 Implement, tools and machinery charges

It included depreciation charges and repairing charges of implements, tools and machinery were worked out by straight line method. The total depreciation charges so obtained were apportioned to mulberry crop on the basis of area. In case of repairs to implements, tools and machinery the actual cost incurred was taken into account. For hired implements actual charges paid for their use were taken as the cost.

Depreciation on fixed capital (rearing house, rearing stand, trays, paraffin paper, foam pad, net, chandrika, etc) used in the silkworm

rearing process was calculated by straight line method and was apportioned on the basis of number rearing.

3.3.12 Economics of Sericulture

The standard cost concepts were used in estimating the cost and returns of sericulture are as follows.

Cost A_1: All actual expenses in cash and kind incurred in production by the producer. The following items are included in cost A_1

i. Hired human labour (male and female)

ii. Owned and hired bullock labour

iii. Manure and fertilizer (N, P & K)

iv. Machinery charges

v. Implement charges

vi. Land revenue and other charges

vii. Irrigation charges

viii. DFL's (Disease Free Layers)

ix. Transportation charges

x. Mulberry cutting

xi. Disinfectants

Cost A_2: A_1 + Rent paid for leased-in land.

Cost B_1: Cost A_2 + Interest on value of owned fixed capital assets

Cost B_2: Cost B_1 + Rental value of owned land

Cost C_1: Cost B_1 + Imputed value of family labour

Cost C_2: Cost B_2 + Imputed value of family labour

Cost C_3: Cost C_3 + 10 per cent of Cost C_2

Estimation of income and employment generation

Income from silkworm rearing comprises of silk produced from cocoon production, manure obtained from the worms, mulberry cuttings sold

out. The method followed in evaluating each of the above item are described below,

i) Cocoons - They are sold to the “District Reshim Sanchanalaya.” This has established procurement centres in the villages. Farmers take their cocoon produce to these centres. The produce is graded on the basis of its quality and accordingly the prices are paid. For estimating the income from cocoon production, the actual rate at which the farmer sold their produce was taken into account. It was normally ranging to Rs. 155 to 164 per kg of cocoons.

ii) Manures obtained from the worms - The silkworm gives out the excreta while feeding, which can be used as manure. The value of this manure was calculated on the basis of price of F.Y.M prevailing in the village.

iii) Mulberry cuttings – Mulberry pruning are undertaken twice in a year. The cuttings are sold to needy farmer. The receipt obtained from the sale of cutting was considered as income from by-product.

Also, the employment generated from sericulture was examined in simple tabular form.

Constraint Analysis

The constraints faced by the farmers in sericulture production were identified and worked out by simple tabular analysis.

CHAPTER IV

SOCIO-ECONOMIC STATUS OF THE WASHIM DISTRICT

The present chapter is devoted to discuss, in brief some of socio-economic features of Washim district of Maharashtra just to facilitate comparison and to get better idea of the economy of these districts.

4.1 Location

Washim is one of the eleven districts of Vidarbha region and was formed after splitting Akola districts on 1 July, 1998. Washim district lies between 19.61 to 21.16 North latitude and 76.07 to 77.14 East longitudes and 600 M MSL altitude. The geographical area of Washim district is 5,150 Sq. Km. Washim district is located in the eastern region of Vidharbha. Akola lies to its North, Amravati lies to its North-East, Hingoli lies to its South, Buldana lies to its West, Yavatmal lies to its East.

4.2 Administrative set up

This district is divided into 3 sub-divisions, namely, Washim, Mangrulpir and Karanja. District has 6 Tehsils, namely- Washim, Risod, Malegon, Mangrulpir, Manora and Karanja. District Collector's office is located in Washim town. There are four Nagar Parishad, six Panchayat Samitis and seven hundred and eighty-nine total villages and four towns.

4.3 Agro climatic conditions

4.3.1 Topography

The district forms part of Deccan Plateau with slop towards Southeast from Sahayadri hills and has a varied topography consisting of hills, plains and undulating topography near river banks. The district forms a part of Godavari and Tapi basins. The Balaghat Plateau comprises of lowlying hills forming water divide. Many of the tributaries to Godavari and Tapi rivers originate from the Balaghat Plateau. Penganga river is the main river of the district. It flows through the Tehsil of Risod. Later it flows through the boundary of Washim and Hingoli districts. River Kaas is the main tributary of Penganga. River Kaas meets Penganga about 1 km from the village

Shelgaon Rajgure. River Arunavati and its tributaries originate in the tehsil of Washim and then flow through the tehsils of Mangrulpir and Manor into the district of yavatmal. River Katepurna originates in the hilly areas of the 8 district and flows northwards through the tehsil of Malegaon and enters the Akola district. There are hilly ranges extending from through the tehsils of Malegaon, Washim, Mangrulpir and Manora. There is plain region in the basins of river Pengang in the Risod tehsil. Other important rivers include Chandrabhaga, Adan, Pus and Bembala.

4.3.2 Soil

The soil of the district is basically derived from Deccan Trap Basalt and major part the district is occupied by medium black soil of 25-50 cm depth occurring in the plains in entire South Western, North Eastern and Northern parts of the district, whereas the shallow black soil of 7.5 to 25 cm depth occur in restricted hilly parts of the district in central elongated part and the Northern peripheral part. The soil profile data is not available in figures given in the Performa.

4.3.3 Climate and rainfall

This climate is tropical in Washim. The average annual temperature in washim is 26.2 °C. The driest month is February. With an average of 33.7 °C in summer (April-May), minimum temperature is about 22 degree Celsius and maximum temperature is about 45 degree Celsius with mean temperature of about 33.5 degree celsius whereas in winter (October-March), minimum temperature is 10 degree celsius and maximum temperature is about 28 degree celsius with mean temperature of about 19 degree celsius and that in rainy season (June – September), minimum temperature is about 18 degree celsius and maximum temperature is about 26 degree celsius with mean temperature of about 17 degree celsius. During the year, the average temperatures vary by 12.9 °C, May is the warmest month. December has the lowest average temperature of the year. It is 20.8°C. Washim district falls in two agroecological zone type viz. assured rainfall zone (ACZ -7) and moderate rainfall Zone (ACZ -8). Risod and Karanja falls under assured rainfall zone (ACZ – 7) covering 170583 ha area

Fig. 1 Map showing Tahasils of Washim district of Maharashtra

and Washim, Malegon, Manora and Mangrulpir falls under Moderate Rainfall Zone (ACZ-8) covering 342541 ha area. Washim district has average annual rainfall of 798.7mm. On an average, thre are above 42 rainy days. In winter, there is much less rainfall in Washim than in summer. There is 5 mm of precipitation in February. With an average of 294 mm, the most precipitation falls in July. The precipitation varies 289 mm between the driest month and the wettest month.

4.4 Demographic features

4.4.1 Population

Table 4.1 Demographic particulars of Washim district

Sr. No.	Description	2011
1.	Actual Population	1,197,160
2.	Male	620,302
3.	Female	576,858
4.	Population growth (%)	17.34%
5.	Density per square kilometres	244.00
6.	Proportion to Maharashtra Population (%)	1.07%
7.	Sex ratio (per 1000)	930.00
8.	Child sex ratio (0-6 Age)	863.00
9.	Average Literacy	83.25
10.	Male literacy	90.55
11.	Female Literacy	75.48
12.	Total child Population (0-6 Age)	1,52,190
13.	Male Population	81,686,00
14.	Female Population	70,504
15.	Literates	869,917
16.	Male Literates	487,703
17.	Female Literates	382,214
18.	Child Proportion (%)	12.71
19.	Boys Proportion (%)	13.17
20.	Girls proportion (%)	12.22

Source: Directorate of census operations in Maharashtra, 2011

As per the Census 2011, the total population of the Washim district was 1,197,160 of which male and female were 620,302 and 576,858 respectively. Washim district population constitutes 1.07 per cent of total Maharashtra population. Population density is 244 per square kilometer. There was change of 17.34 per cent in the population compared to population as per 201. The ratio of female population per thousand of male is 930. Child sex ratio (0-6) years of age is 863. The district is with literacy level of 83.25 per cent.

4.5 Land utilization pattern

The details of land utilization pattern of Washim district are presented in Table 4.2

Table 4.2. Land utilization pattern of Washim district

Sr. No.	Contents	Area '000' ha	Per cent to total
1.	Area for land utilization statistics	548	100.00
2.	Forest	35	6.38
3.	Barren and uncultivable land	18	3.28
4.	Land put on non-agricultural use	8	1.45
5.	Cultural waste land	10	1.82
6.	Permanent pasture and other grazing land	34	6.20
7.	Land under miscellaneous tree crops and groves not included in net area sown	2	0.36
8.	Current fallows	7	1.27
9.	Other fallows	12	2.18
10.	Net area sown	387	70.62
11.	Area sown more than once	35	6.38
12.	Gross cropped area	422	77.00
13.	Cropping intensity		109.04

4.6 Cropping pattern

The usual cropping is determined by large number of factors. The most important factors are climate, soil, topography, customs and distant to market.

Table 4.3 Cropping pattern of Washim district

Sr. No.	Crops	Area (in '000' ha)	Percentage to total
1.	Wheat	16	3.79
2.	Kharif jowar	10	2.36
3.	Rabi jowar	8	1.89
4.	Bajra	6	1.42
5.	Other cereals	15	3.55
	Total cereals	55	13.03
6.	Gram	17	4.02
7.	Tur	56	13.27
8.	Other pulses	55	13.03
	Total pulses	**128**	**30.33**
	Total food grains	**183**	**43.36**
9.	Sugarcane	0.2	0.04
10.	Cotton	5.8	1.37
	Total fibre	**6**	**1.42**
11.	Sunflower	00	-
	Kharif	12	2.84
	Rabi	9	2.13
	Summer	3	0.71
12.	Summer groundnut	45	10.66
13.	Soyabean	156	36.96
14.	Safflower	8	1.89
	Total oilseed	**233**	**55.22**
	Total gross cropped area	**422**	**100**

4.7 Cropping Season and crop rotation

There are two important crop seasons i.e. Kharif and Rabi whereas in summer season land generally remains fallow and preparatory tillage operations are undertaken.

Cotton, jowar are important crops grown in Kharif season on large scale. Tur, mung, udid, are also grown in Kharif on large scale. Soyabean crop is grown by the farmers on large area. Wheat and gram are

important Rabi crops grown in the area. Linseed, sunflower, safflower, some spices and vegetable, fruit crop are also grown in Rabi season wherever the sources of irrigation is mostly through wells and canals. The manner in which crop rotation are commonly followed is presented in Table 4.4.

Table 4.4 Cropping Season and crop rotation in Washim district

Sr. No.	Kharif	Rabi
1.	Cotton	-
2.	Cotton + Tur + Jowar	-
3.	Soyabean	Gram
4.	Soyabean + Tur	Wheat
5.	Jowar	Gram
6.	Cotton + Mung / Udid	Safflower / wheat
7.	Cotton + Tur	Safflower
8.	Cotton + Tur + Jowar + Mung	Sunflower
9.	Mung	Safflower
10	Cotton + Mung	-

4.9 Marketing and Transportation

For marketing of agricultural produce agriculture marketing committees are functioning in the district. Out of 6, 5 tehsils have facility of regulated market. Markets are connected with roads and facilities of banking, electricity, telephone communication, internet facility, etc. Bullock carts and tractors are means of transportation of agriculture produce

CHAPTER V

RESULTS AND DISCUSSION

The present investigation had been undertaken with a view to study the economic analysis of sericulture in Washim district. The chapter deals with the socio-economic status of selected farmers which includes family size, educational status, land use pattern, cropping pattern and economics of selected farming systems. The results obtained from investigation were presented and then discuss critically in this chapter under the major headings are given below

1. To estimate the cost and returns of sericulture.
2. To examine the employment generation from sericulture.
3. To study the constraints faced by sericulture growers.

I. Socio-economic status of sample farmers

5.1 Average family size of selected sericulture farmers

Average family size of selected sericulture farmers in Washim district are presented in Table 5.1

Table 5.1 Average family size of selected sericulture farmers (No.)

Sr. No.	Particulars	Small	Medium	Large	Overall
1	Male	2 (40.00)	3 (50.00)	3 (50.00)	3 (50.00)
2	Female	2 (40.00)	2 (33.33)	2 (33.33)	2 (33.33)
3	Children	1 (20.00)	1 (16.67)	1 (16.67)	1 (16.67)
	Total	**5 (100.00)**	**6 (100.00)**	**6 (100.00)**	**6 (100.00)**

(Figures in parentheses indicates percentage to the total family members)

The Table 5.1 revealed that, the average family size was 5 members in small group and 6 members each in medium and large size group. The share of male in family size was the highest in medium and large size group i.e. 50 per cent followed by small size group i.e. 40.00 percent.

Whereas, share of female was the highest in small size group i.e. 40.00 per cent and it is followed by medium and large size group i.e. 33.33 per cent.

The share of children in family size was observed highest in small size group i.e. 20.00 per cent and followed by medium and large size group i.e. 16.67 per cent. The overall size of family was 6 members including 50.00 per cent male, 33.33 per cent female and 16.67 per cent children per family. From the table it is also noticed that in all size grouped only one child was observed in family indicating that the rural are also moving towards nuclear family.

5.2 Educational status of selected sericulture farmers

Education is important variable in determining the educational status of selected farmers which influences the standard of living. The educational status of sericulture farmers is presented in Table 5.2.

Table 5.2 Educational status of selected sericulture farmers (No.)

Sr. No.	Educational Status	Small	Medium	Large	Overall
1	Illiterate	6.00 (30.00)	3.00 (15.00)	1.00 (5.00)	3.33 (16.65)
2	Primary	7.00 (35.00)	4.00 (20.00)	3.00 (15.00)	4.66 (23.30)
4	High school	5.00 (25.00)	9.00 (45.00)	7.00 (35.00)	7.00 (35.00)
5	Graduation and above	2.00 (10.00)	4.00 (20.00)	9.00 (45.00)	5.00 (25.00)
	Total	20.00 (100.00)	20.00 (100.00)	20.00 (100.00)	20.00 (100.00)

(Figures in parentheses indicates percentage to the total)

It is observed from the Table 5.2 that, the overall illiteracy percentage was 16.65 per cent. Among the different groups percentage of illiteracy was observed in small size group i.e. 30 per cent and medium size group i.e. 15 per cent and large size group i.e. 5 per cent. The percentage of primary education was observed highest in small size group i.e. 35 per cent

followed by medium size group 20 per cent and large size group 15 per cent. The percentage of high school education was observed highest in medium size group i.e. 45 per cent followed by large size group i.e. 35 per cent and small size group i.e. 25 per cent. The number of farmers having graduate and above level education was highest in large size group i.e. 45 per cent followed by medium size group i.e. 20 per cent and small size group i.e. 10 per cent.

It is observed from the table that the educational pattern in the era of the information technology, at overall level the highest percentage of educational level of the sericulture farmers was highest in high school level 35 per cent. It is followed by graduation (25%) and primary (23.30%). The illiterate farmers were 16.65 per cent. It indicates that the illiteracy percentage was decrease from small to large farmers.

5.3 Land Utilization

The details about the size of holding land utilization of the selected farmers is seen from Table 5.3 that the average size of holding of farmers was 4.38 hectare. The highest holding was 5.52 hectare, whereas, lowest holding was 2.06 hectares. Also, the cropping intensity of medium farmer's land is seen to be the highest i.e. 194.79 per cent.

Table 5.3 Land utilization pattern (Area in ha.)

Sr. No.	Particulars	Small	Medium	Large	Overall
1.	Total land	2.06	3.41	5.52	4.38
2.	Permanent fallow land	0.16	0.15	0.47	0.26
3.	Net Cultivated area	1.90	3.26	5.05	3.40
	Irrigated area	0.91	2.90	4.11	2.64
	Rainfed area	0.95	0.35	0.74	0.68
4.	Area sown more than once	1.36	3.09	4.16	2.96
5.	Gross cropped area	3.26	6.35	9.21	6.27
	Cropping intensity (%)	171.58%	194.79%	182.38%	171.84%

(Figures in parentheses indicates percentage to the total)

5.4 Cropping Pattern

Table 5.4 reveals that majority of farmer in small group had taken cotton and Soyabean crop, which shared 49.06 per cent area during kharif season. In small group area under mulberry garden shares only 12.26 per cent of the total cropped area. Contribution of Jowar crop 10.55 per cent in medium group, whereas contribution of cotton crop was highest in small group and it was worked out to be 21.71 per cent of the total cropped area. Area contribution of mulberry in total cropping pattern was the lowest in medium group 11.33 per cent and the highest in large group to the tuned of 15.20 per cent. The area under mulberry crop increases with size of group . Average contribution of mulberry garden in the total cropping pattern was 13.39 per cent.

Table 5.4 Cropping pattern adopted by selected sericulture farmers

(Area in ha)

Sr. No.	Particulars	Small	Medium	Large	Overall
I.	**Kharif**				
1.	Cotton	1.20 (36.80)	1.80 (28.34)	2.00 (21.71)	1.67 (26.63)
	Tur	0.30 (9.20)	0.24 (3.77)	0.60 (6.51)	0.38 (6.06)
	Mung	-	0.20 (3.14)	0.65 (7.05)	0.28 (4.46)
	Soyabean	0.40 (12.26)	1.02 (16.06)	1.80 (19.54)	1.07 (17.06)
	Total kharif	1.90 (58.28)	3.26 (51.33)	5.05 (54.83)	3.40 (54.22)
II	**Rabi**				
	Wheat	0.26 (7.97)	0.60 (9.44)	0.80 (8.68)	0.55 (8.77)
	Gram	0.15 (4.60)	0.45 (7.08)	0.90 (9.77)	0.50 (7.97)
b)	**Total rabi**	0.41 (12.57)	1.05 (16.53)	1.70 (18.45)	1.05 (16.74)
III	**Summer**				
	Jowar	0.30 (9.20)	0.67 (10.55)	0.85 (9.22)	0.60 (9.56)
IV	**Vegetable (Horti)**	0.25 (7.66)	0.65 (10.23)	0.21 (2.28)	0.37 (5.90)
V	**Mulberry**	0.40 (12.26)	0.72 (11.33)	1.40 (15.20)	0.84 (13.39)
	Gross cropped area	3.26 (100)	6.35 (100)	9.21 (100)	6.27 (100)

(Figures in parentheses indicates percentage to the total)

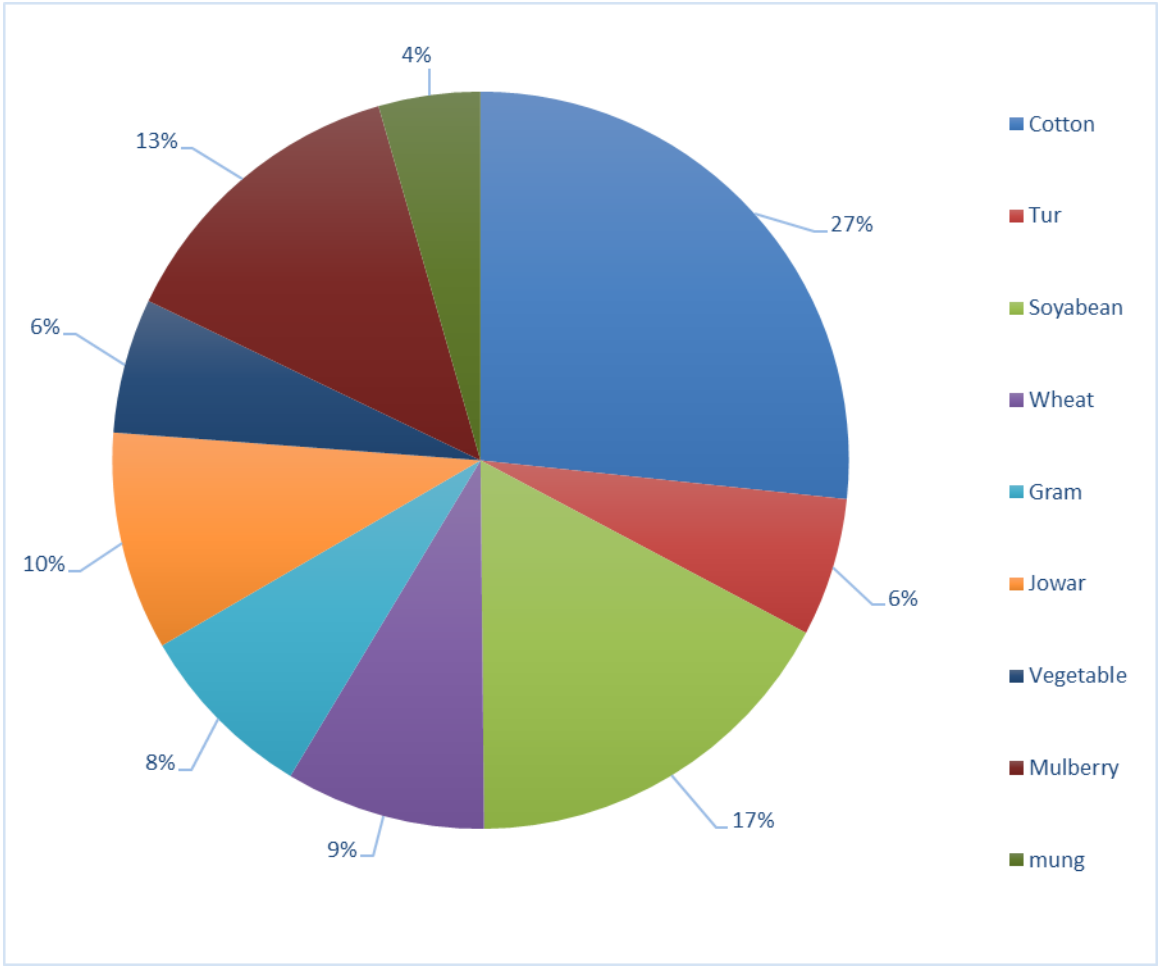

Fig. 2 Cropping Pattern adopted by selected farmers (Area in hectare)

II. Establishment of mulberry garden

Mulberry plant has a bushy structure having life span of about 15 years. Cultivation of mulberry garden is the basic need for earning of silk cocoon. Since, mulberry garden and rearing of silk cocoon are two inter dependent aspects of silk production, proper rearing of mulberry garden is very necessary for getting fresh, ample and continuous feed to larvae in the form of mulberry leaves in order to get fabulous silk cocoon production and to reaps greater profits.

It is observed from Table 5.5, 5.6, 5.7 and 5.8 reflects that, on an average 112.68 human labour days and 19.48 bullock labour days were required for establishment of mulberry garden, (during the period of six months) during which operations like ploughing, harrowing, planting of cuttings, manures, fertilizers, irrigation and interculture operations were carried out. Ploughing, harrowing and manure application were the items in which maximum share was contributed by male human labour and bullock labour, amounting 34.35 per cent and 69.31 per cent respectively and planting of mulberry cuttings and weeding were the items in which female labour exhibited maximum contribution of 89.86 per cent as marked from medium group. Further, it was noticed that with the increase in the area of mulberry garden the contribution of family labour declined greatly. As expected, that quantum of total human labour would decreases with the increase in the area of mulberry garden was not observed but a reverse trend was noticed, which indicated that large group took more efforts and care in establishing of mulberry garden.

Establishment of mulberry garden in different size group holdings and depending on the capacity of DFLs of mulberry growers was worked on per hectare basis in three groups, i.e. small, medium and large is presented in Table 5.9 reveals that, per hectare establishment cost of mulberry garden in small, medium and large group was worked out to be Rs. 50520.40, Rs. 61367.30 and Rs.84990.30 per hectare (at cost C3) respectively. The contribution of cost A_2 and B_2 to cost C_3 was 39.03 per cent and 74.68 per cent in small group, 49.82 per cent and 86.46 per cent in

medium group and 58.07 per cent and 90.91 per cent in large group respectively. However average contribution of these costs was 50.61 per cent and 85.36 per cent.

Among direct cost i.e. cost A, maximum shares of 17.63 per cent and 26.18 per cent in medium and large group was held by hired human labour. However, this item ranked second in small group with 10.41 per cent. This was followed by hired bullock labour which shared 13.83 per cent in medium group and 15.44 per cent in large group respectively but it ranked first in small group with 11.87 per cent. Among indirect cost i.e. cost B, rental value of land had highest contribution in small, medium and large group accounting 32.55 per cent, 33.74 per cent and 30.54 per cent respectively.

Average cost indicated an identical trend of contribution of different items in which hired human labour had the highest contribution of 19.40 per cent followed by bullock labour which was 14.02 per cent while average cost of rental value contributed 32.05 per cent.

On an average per hectare 1.56 trolley of manure costing Rs.3133.33, planting material 5566.67 cuttings costing Rs. 2783.33, 3.03 bag of fertilizer was applied by mulberry growers for raising of mulberry garden. Overall cost A_2, B_1, B_2, C_1, C_2 and C_3 worked out to be Rs. 33214.80, Rs. 34981.90, Rs. 56016.70, Rs. 38625.20, Rs. 59660.00 and Rs. 65626.00.

Table 5.5 Operation-wise labour requirement for the establishment of mulberry garden of small group

(Labour man days / ha)

Sr. No.	Operations	Frequency	Small Group								
			Owned			Hired			Total		
			M	F	B	M	F	B	M	F	B
1.	Ploughing	1	8.50 (25.40)	-	4.50 (47.36)	-	-	-	8.50 (22.11)	-	4.50 (37.50)
2.	Harrowing	2	5.00 (14.92)	-	2.50 (26.31)	2.50 (50.00)	-	2.50 (100)	7.50 (19.48)	-	5.00 (41.65)
3.	Transport & Manure application	1	2.50 (7.46)	2.50 (25.00)	2.50 (26.33)	2.50 (50.00)	2.50 (9.10)		5.00 (12.98)	5.00 (13.34)	2.50 (20.84)
4.	Farm ridges and Furrow	1	-	-	-	-	-	-	-	-	-
4.	Planting of Mulberry cuts	1	3.60 (10.47)	3.40 (34.00)	-	-	10.00 (36.66)	-	3.60 (6.49)	13.40 (33.33)	-
5.	Fertilizer application	1	-	-	-	-	-	-	-	-	-
6.	Irrigation	1	7.00 (20.89)	-	-	-	-	-	7.00 (18.18)	-	-
7.	Fencing	1	3.00 (8.95)	-	-	-	-	-	3.00 (7.79)	-	-
8.	Interculture										
a)	Hoeing	1	-	-	-	-	-	-	-	-	-
b)	Weeding	1	2.50 (7.46)	2.50 (25.00)	-	-	10.00 (36.36)	-	2.50 (6.49)	12.50 (33.33)	-
9)	Gap filling	1	1.40 (4.17)	1.60 (16.00)	-	-	5.00 (18.18)	-	1.40 (3.63)	6.60 (17.60)	-
	Total		33.50 (100)	10.00 (100)	9.50 (100)	5.00 (100)	27.50 (100)	2.50 (100)	38.50 (100)	37.50 (100)	12.0 (100)

Table 5.6 Operation-wise labour requirement for the establishment of mulberry garden of medium group

(Labour man days / per ha)

Sr. No.	Operations	Medium Group									
		Frequency	Owned			Hired			Total		
			M	F	B	M	F	B	M	F	B
1.	Ploughing	1	1.05 (8.34)	-	3.55 (25.70)	4.43 (15.20)	-	0.52 (16.45)	5.39 (13.43)	-	4.07 (23.99)
2.	Harrowing	2	1.58 (12.55)	-	5.26 (38.08)	4.34 (15.20)	-	0.39 (12.34)	5.92 (14.75)	-	5.66 (33.35)
3.	Transport & Manure application	1	1.45 (11.52)	0.39 (14.13)	1.57 (11.36)	3.68 (12.88)	1.57 (4.60)	1.31 (41.45)	5.13 (12.79)	1.97 (5.34)	2.89 (17.03)
4.	Farm ridges and Furrow	1	0.52 (4.13)	-	1.58 (11.47)	1.58 (5.53)	-	-	2.10 (5.23)	-	1.58 (9.31)
5.	Planting of Mulberry cuts	1	1.39 (12.00)	0.79 (28.62)	-	3.68 (12.88)	15.13 (44.40)	-	5.07 (12.32)	15.92 (43.22)	-
6.	Fertilizer application	1	0.93 (7.39)	0.53 (19.21)	-	1.31 (4.58)	1.19 (3.60)	-	2.24 (5.58)	1.73 (4.80)	-
7.	Irrigation	1	1.32 (10.49)	-	-	2.63 (9.27)	-	-	3.95 (9.60)	-	-
8.	Fencing	1	1.18 (10.18)	-	-	1.20 (4.20)	-	-	2.38 (5.78)	-	-
9.	Interculture										
a)	Hoeing	1	0.52 (4.13)	-	1.85 (13.39)	3.16 (11.06)	-	0.94 (29.76)	3.68 (9.17)	-	2.79 (16.33)
b)	Weeding	1	0.39 (3.10)	1.05 (38.04)	-	0.13 (0.45)	16.18 (47.40)	-	0.52 (1.29)	17.24 (46.64)	-
10.	Gap filling	1	1.26 (10.88)	-	-	2.50 (8.75)	-	-	3.76 (9.14)	-	-
	Total		1.58 (100)	2.76 (100)	13.81 (100)	28.55 (100)	34.07 (100)	3.16 (100)	41.13 (100)	36.83 (100)	16.97 (100)

Table 5.7 Operation-wise labour requirement for the establishment of mulberry garden of large group

(Labour man days / per ha)

Sr. No.	Operations	Large Group									
		Frequency	Owned			Hired			Total		
			M	F	B	M	F	B	M	F	B
1.	Ploughing	1	-	-	5.00 (19.04)	10.00 (17.04)	-	-	10.00 (15.09)	-	5.00 (19.04)
2.	Harrowing	2	-	-	7.50 (28.57)	8.75 (14.89)	-	-	8.75 (13.21)	-	7.50 (28.57)
3.	Transport & Manure application	1	-	-	3.75 (14.28)	5.00 (8.51)	-	-	5.00 (7.55)	-	3.75 (14.28)
4.	Farm ridges and Furrow	1	-	-	5.00 (19.07)	5.00 (8.51)	-	-	5.00 (7.55)	-	5.00 (19.04)
4.	Planting of Mulberry cuts	1	-	-	-	5.00 (8.51)	31.25 (44.64)	-	5.00 (7.54)	31.50 (40.64)	-
5.	Fertilizer application	1	-	-	-	5.00 (8.51)	5.00 (7.15)	-	12.50 (18.87)	12.50 (16.12)	-
6.	Irrigation	1	-	-	-	8.50 (14.46)	-	-	8.50 (12.83)	-	-
7.	Fencing	1	-	-	-	4.00 (6.80)	-	-	4.00 (6.03)	-	-
8.	Interculture										
a)	Hoeing	1	-	-	5.00 (19.04)	5.00 (8.51)	-	-	5.00 (7.55)	-	5.00 (19.07)
b)	Weeding	1	-	-	-	-	33.75 (48.21)	-	-	33.75 (43.54)	-
9)	Gap filling	1	-	-	-	2.50 (4.25)	-	-	2.50 (3.77)	-	-
	Total		-	-	26.25 (100)	58.75 (100)	70.00 (100)	-	66.25 (100)	77.50 (100)	26.25 (100)

Table 5.8 Overall operation-wise labour requirement for the establishment of mulberry garden

(Labour man days)

Sr. No.	Operations	Frequency	Owned			Hired			Total		
			M	F	B	M	F	B	M	F	B
1.	Ploughing	1	4.77 (20.29)	-	4.35 (23.18)	7.17 (21.41)	-	0.52 (12.35)	11.94 (19.60)	-	4.52 (23.20)
2.	Harrowing	2	3.29 (14.00)	-	5.09 (27.13)	-	-	1.44 (34.20)	3.29 (5.40)	-	6.05 (31.05)
3.	Transport & Manure application	1	1.97 (8.38)	1.44 (18.27)	2.61 (13.91)	3.73 (10.35)	2.03 (4.62)	1.31 (31.62)	5.70 (9.35)	3.47 (6.70)	3.04 (15.06)
4.	Farm ridges and Furrow	1	0.52 (2.21)	-	3.29 (17.53)	3.29 (9.13)	-	-	3.81 (6.25)	-	3.29 (16.88)
5.	Planting of Mulberry cuts	1	2.49 (10.89)	2.09 (26.59)	-	4.34 (12.05)	18.79 (42.81)	-	6.83 (11.21)	20.88 (39.47)	-
6.	Fertilizer application	1	0.92 (3.91)	0.53 (6.72)	-	3.15 (8.74)	3.09 (7.04)	-	4.07 (6.68)	3.62 (6.99)	-
7.	Irrigation	1	4.16 (17.70)	-	-	5.56 (15.44)	-	-	9.72 (15.95)	-	-
8.	Fencing	1	2.09 (8.89)	-	-	2.60 (7.22)	-	-	4.69 (7.69)	-	-
9.	Interculture										
a)	Hoeing	1	0.53 (2.25)	-	3.42 (18.23)	4.08 (11.33)	-	0.94 (22.33)	4.61 (7.56)	-	2.58 (13.24)
b)	Weeding	1	1.44 (6.12)	1.77 (22.40)	-	0.13 (0.36)	19.98 (45.53)	-	1.77 (2.90)	21.75 (42.01)	-
10.	Gap filling	1	1.33 (5.65)	1.60 (20.30)	-	2.50 (6.94)	-	-	5.43 (8.91)	1.60 (3.09)	-
	Total		23.5 (100)	7.88 (100)	18.76 (100)	36.01 (100)	43.89 (100)	4.21 (100)	60.91 (100)	51.77 (100)	19.48 (100)

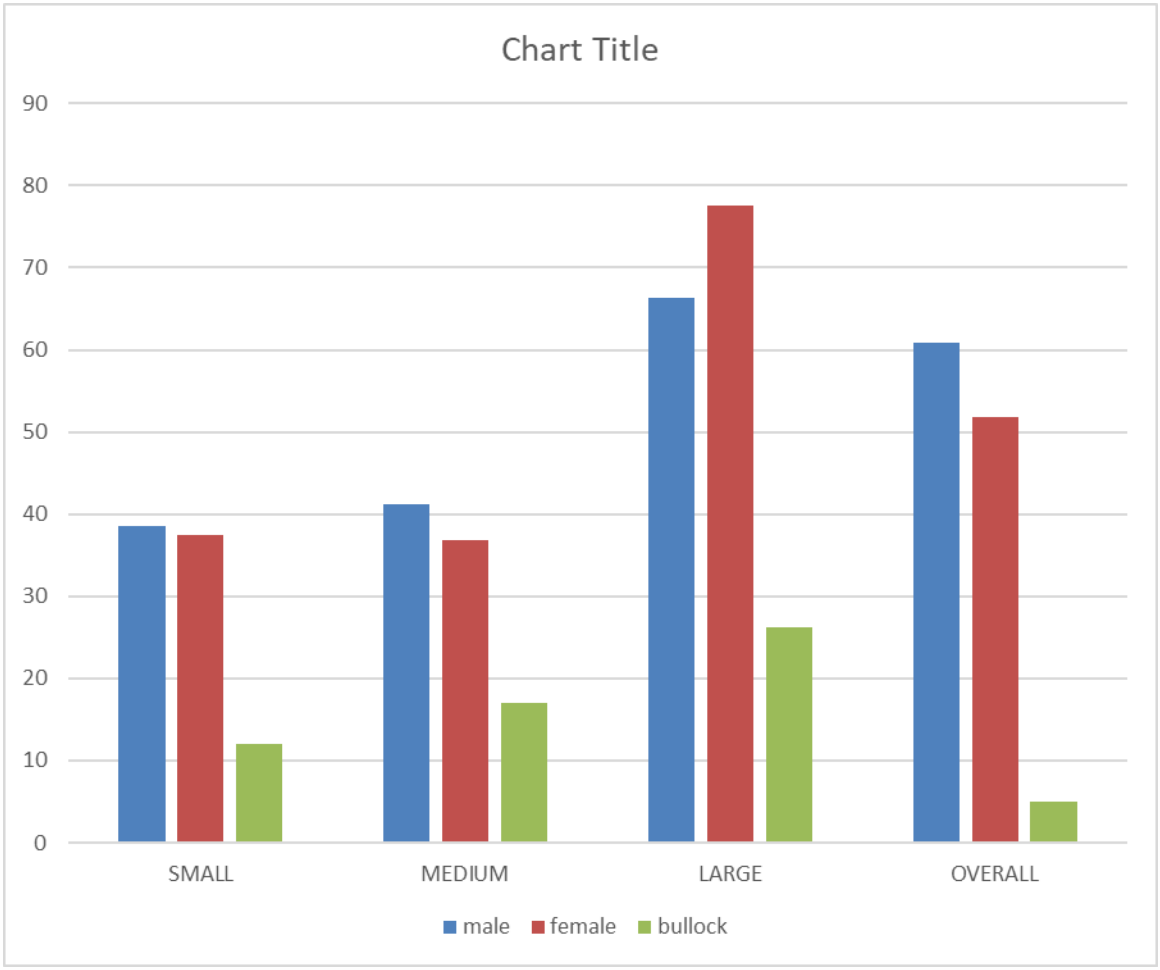

Fig.3 Labour requirement for establishment of mulberry garden (days/ha)

Table 5.9 Establishment cost of mulberry garden **(per hectare)**

Sr. No.	Item	Small group		Medium group		Large group		Overall	
		Unit	Cost in Rs.	Unit	Cost in Rs.	Unit	Cost in Rs.	Unit	Cost in Rs.
1.	Total Hired Human Labour	32.50	5125 (10.41)	62.62	10820.50 (17.63)	128.75	22250 (26.18)	74.62	12731.80 (19.40))
	Male (@Rs.200/day)	5.00	1000 (1.98)	28.55	5710 (9.30)	58.75	11750 (13.83)	30.76	6513.33 (9.92)
	Female (@ Rs.150/day)	27.50	4125 (8.16)	34.07	5110.50 (8.33)	70.00	10500 (12.35)	43.85	6578.50 (10.02)
2.	Hired Bullock labour (@ Rs.500/day)	12.00	6000 (11.87)	16.97	8485 (13.83)	26.25	13125 (15.44)	18.40	9203.33 (14.02)
3.	Manure (Rs.2000/trolley)	1	2000 (3.96)	1.60	3200 (5.21)	2.1	4200 (4.94)	1.56	3133.33 (4.77)
4.	Planting Material (0.50/cutting)	5000	2500 (4.95)	5600	2800 (4.56)	6100	3050 (3.59)	5566.67	2783.33 (4.24)
5.	Fertilizer (Rs.850/bag)	2.5	2125 (4.21)	3.1	2635 (4.29)	3.5	2975 (3.50)	3.03	2578.33 (3.93)
6.	Irrigation charges (Rs.)	-	400 (0.79)		425 (0.69)		460 (0.54)		428.33 (0.65)
7.	Depreciation (Rs.)	-	450 (0.89)		475 (0.77)		490 (0.58)		471.66 (0.72)
8.	Land Revenue (Rs.)	-	30 (0.06)		32.5 (0.05)		36.75 (0.04)		33.08 (0.05)
9.	Interest on Working Capital (Rs.)	-	1089.00 (2.16)		1701.93 (2.77)		2763.60 (3.25)		1851.51 (2.82)

10.	Cost “A1” Rs. (1+9)	-	19719 (39.03)		30574.90 (49.82)		49350.40 (58.07)		33214.80 (50.61)
11.	Rental Value Leased in land		0		0		0		0
12.	Cost “A2” Rs (10+11)		19719 (39.03)		30574.90 (49.82)		49350.40 (58.07)		33214.80 (50.61)
13.	Interest on Fixed capital (10%)	-	1566.66 (3.10)		1780.00 (2.90)		1954.66 (2.29)		1767.11 (2.69)
14.	Cost “B1” Rs (12+13)		21285.70 (42.13)		32354.90 (52.72)		51305.00 (60.37)		34981.90 (53.30)
15.	Rental value of Land		16442 (32.55)		20703.50 (33.74)		25958.90 (30.54)		21034.80 (32.05))
16.	Cost “B2” Rs. (14+15)		37727.70 (74.68)		53058.40 (86.46)		77263.90 (90.91)		56016.70 (85.36)
	Family: Male (@200/- per day)	33.50	6700 (13.26)	11.58	2316 (3.77)	-	-	15.02	3005.33 (4.58)
	Female (@150/- per day)	10.00	1500 (2.97)	2.76	414 (0.67)	-	-	4.25	638.00 (0.97)
17.	Subtotal	43.50	8200 (16.23)	14.34	2730 (4.45)	-	-	19.28	3643.33 (5.55)
18.	Cost “C1” Rs. (14+17)		29485.70 (58.36)		35084.90 (57.17)		51305.00 (60.37)		38625.20 (58.86)
19	Cost “C2” Rs. (16+17)		45927.70 (90.91)		55788.40 (90.91)		77263.99 (90.91)		59660.00 (90.91)
20.	10 % of Cost C2		4592.77 (9.09)		5578.84 (9.09)		7726.39 (9.09)		5966.00 (9.09)
21.	Cost “C3” Rs. (19+20)		50520.40 (100)		61367.30 (100)		84990.30 (100)		65626.00 (100)

(Figures in parentheses indicates the percentage to cost C_3)

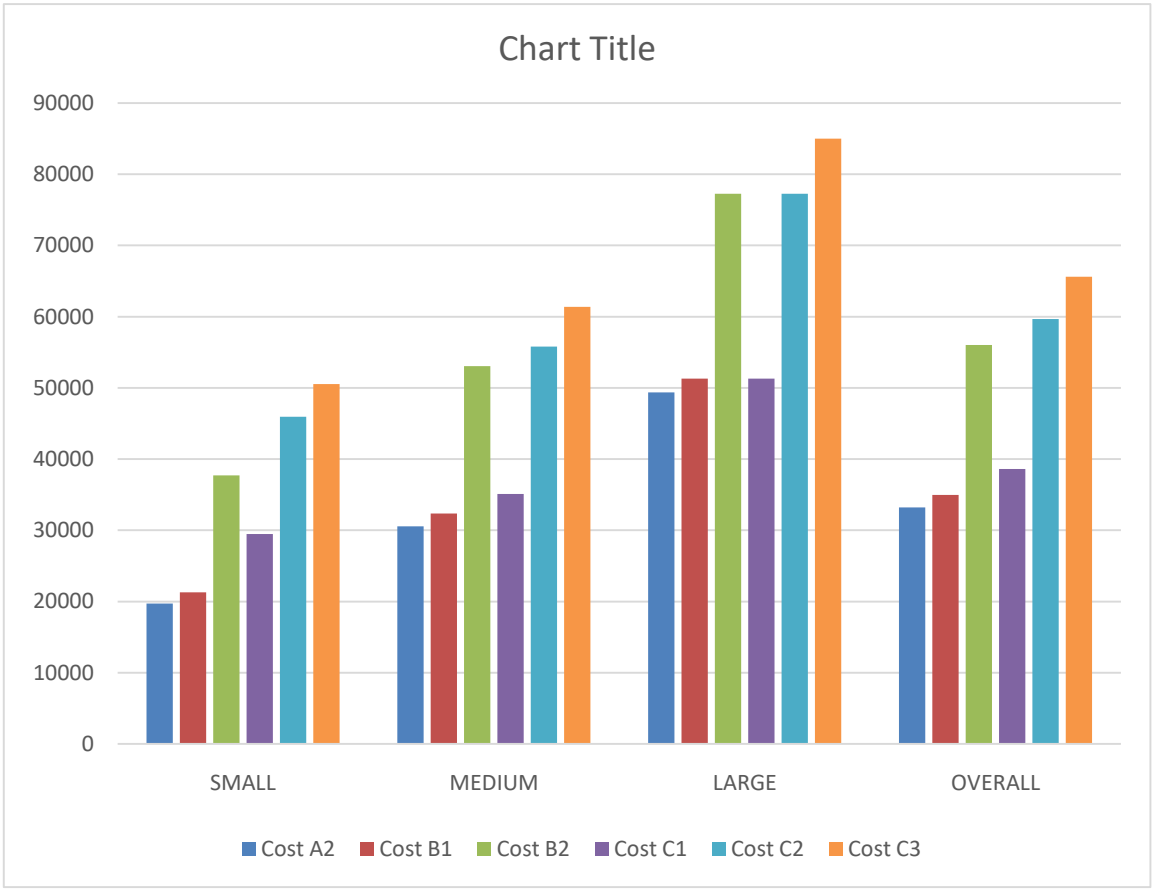

Fig.4 Establishment cost of mulberry garden (Rs/ha)

Table 5.10 Operation-wise input utilization for maintenance of mulberry garden and silk cocoon rearing

Sr. No.	Operation	Small Group			Medium Group			Large group			Overall		
		M	F	B/T	M	F	B/T	M	F	B/T	M	F	B/T
A)	**Maintenance of Mulberry garden**												
1.	Interculture	14.27 (6.02)	9.55 (9.38)	7.04	23.04 (7.49)	9.76 (7.28)	9.42	29.14 (7.35)	17.66 (10.47)	11.06	22.15 (7.06)	12.32 (9.13)	9.17
2.	Fertilizer application	6.56 (2.76)	17.34 (17.03)	--	11.17 (3.63)	25.22 (18.81)	--	15.24 (3.84)	26.46 (15.68)	--	10.99 (3.50)	23.00 (17.05)	--
3.	Pruning	20.22 (8.53)	--	--	35.55 (11.56)	--	--	44.04 (11.11)	--	--	33.27 (10.61)	--	--
4.	Irrigation	15.02 (6.34)	--	--	20.27 (6.59)	--	--	36.14 (9.12)	--	--	23.81 (7.59)	--	--
	Total 'A'	56.07 (23.67)	26.89 (26.41)	7.04	90.03 (29.28)	34.98 (26.09)	9.42	124.56 (31.44)	44.12 (26.15)	11.06	90.22 (28.78)	35.32 (26.19)	9.17
B)	**Rearing of Cocoon**												
5.	Disinfecting	9.39 (3.96)	--	--	12.07 (3.92)	--	--	17.11 (4.31)	--	--	12.85 (4.10)	--	--
6.	Transport of DFLs & Marketing	8.31 (3.50)	--	--	12.41 (4.03)	--	--	18.07 (4,56)	--	--	12.93 (4.12)	--	--
7.	Harvesting of leaves	42.05 (17.94)	40.93 (40.21)	--	50.70 (16.48)	52.44 (39.11)	--	68.42 (17.27)	63.11 (37.41)	--	53.72 (17.14)	52.16 (38.68)	--
8.	Feeding and bed cleaning	62.27 (26.28)	33.33 (32.74)	--	69.77 (22.69)	42.87 (31.97)	--	75.58 (19.07)	57.33 (33.99)	--	69.20 (22.08)	44.51 (33.01)	--
9.	Collection & maintenance of ripened cocoons	31.34 (13.23)	0.32 (0.31)	--	39.76 (12.93)	1.90 (1.41)	--	53.86 (13.59)	2.05 (1.21)	--	41.65 (13.29)	1.42 (1.05)	--
10.	Harvesting of cocoons	`27.44 (11.58)	0.32 (0.31)	--	32.46 (10.55)	1.87 (1.39)	--	38.56 (9.73)	2.05 (1.21)	--	32.82 (10.47)	1.41 (1.04)	--
	Total B	180.8 (76.32)	74.98 (73.66)	--	217.17 (70.63)	99.08 (73.90)	--	271.6 (68.55)	124.54 (73.84)	--	223.17 (71.21)	99.5 (73.08)	--
	Grand Total (A+B)	236.87 (100)	101.79 (100)	7.04	307.47 (100)	134.06 (100)	9.42	396.16 (100)	168.66 (100)	11.06	313.39 (100)	134.82 (100)	9.17

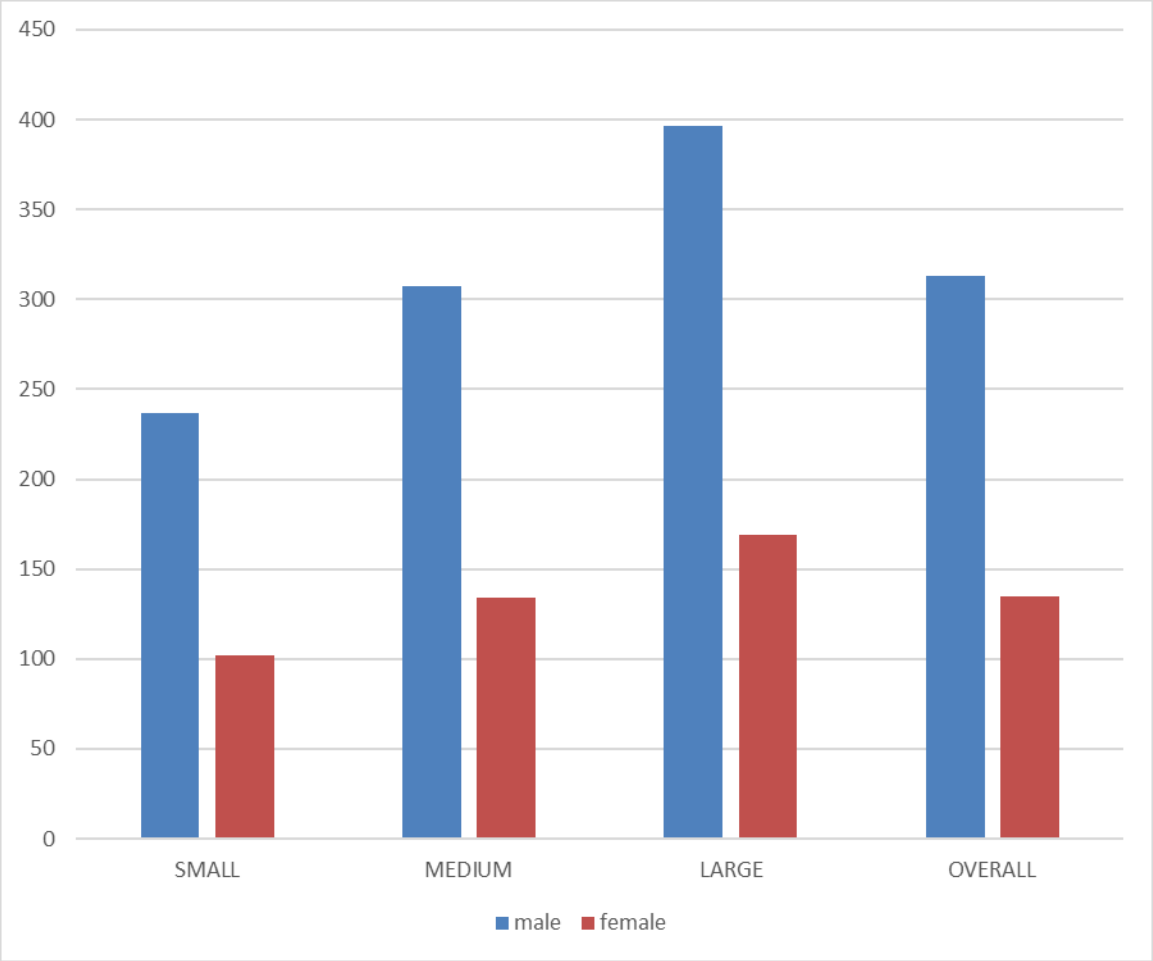

Fig. 5 Human Labour requirement for maintenance of mulberry garden and rearing of silk cocoon (days/ha)

III. Maintenance of garden and rearing of silk cocoon

Once the mulberry garden is established it is to be maintained every year. The expenditure therefore involved is treated as maintenance cost. Side by side the DFLs are also to be needed to be reared in rearing house maintained for the purpose. After the hatching of eggs from DFLs to its last stage of growth, it normally takes one-month period to get production of silk cocoon. Such five rearing of DFLs are taken and production of cocoon are normally available during the year. The maintenance of mulberry garden ad rearing of silk cocoon involves huge human labour to be employed and capital investment.

It is observed Table 5.10 that total 338.66 human labour days were required for small group holders which is inclusive of both the activities i.e. maintenance of mulberry garden and rearing of silk cocoon and proportion works out to 23.67 per cent male and 26.41 per cent female labour followed by 76.32 per cent male and 73.66 per cent of female labour, respectively. More or less similar trend of this proportion was noticed in remaining group which indicated that rearing of silk cocoon has nearby double the employment potential than raising of mulberry garden.

Among the maintenance of mulberry garden maximum male labour employed of 8.53 perc ent, 11.56 per cent and 11.11 per cent for pruning in small, medium and large group, respectively. This was followed by irrigation which accounted for 6.34 per cent, 6.59 per cent and 9.12 per cent and further followed by interculture operation which worked out to be 6.02 per cent, 7.49 per cent and 7.35 per cent for small, medium and large group respectively. However total requirement of male labour for these operations was 23.67 per cent, 29.28 per cent and 31.44 per cent for small, medium and large group, respectively.

Contribution of female labour was more observed for fertilizer application which accounted for 17.03 per cent, 18.81 per cent and 15.68 per cent in small, medium and large group respectively. Bullock and tractor labour had maximum contribution of 100 per cent for their interculture operation in all the groups.

As regard rearing of silk cocoon in rearing house human labour was utilized for operations like disinfecting rearing house, harvesting leaves, chaffing and feeding, cleaning trays and transfer of larvae and collection of ripened cocoons. It was noticed that harvesting of leaves, feeding and bed cleaning operation consumed maximum human labour days (male and female) and the contribution of these operations worked out to be 44.22 per cent male and 72.95 per cent female labour in small group, 39.17 per cent male and 71.08 per cent female labour in medium group, while 36.34 percent male and 71.40 per cent female labour in large group. Overall contribution was found to be 39.22 per cent male and 71.69 per cent female labour.

Overall trend of human labour employment depicted in the Table 5.10 that, with the increase in the size of mulberry garden area and DFL rearing capacities per hectare requirement of human labour declined. This could be observed from the figure that 82.96, 125.01 and 168.68 human labour days were required for maintenance of mulberry garden and 255.78, 316.25 and 396.14 human labour days were required for rearing silkworm in small, medium and large groups, respectively.

Employment generation of sericulture in Washim district

Employment potential for sericulture in Washim district was estimated from the foregoing study. It is seen from Table 5.11 that on an average per hectare male and female requirement for silk cocoon rearing is as under

Table 5.11 Employment generation of sericulture in Washim district

Sr. no	Particulars	Labours		Total
		Male	Female	
1.	Establishment (days)	60.91	51.77	112.68
2.	Maintenance/ Rearing (days)	313.39	134.82	448.21
	Total	374.3	186.59	560.89

It is observed in Table 5.11 that silk cocoon industry has a great employment potential of 560.89 human labour days. One male and one female labour can get the employment throughout the year continuously.

Washim district has 5567.35 hectares of land under irrigation, on which different fruit crops and cereals are grown. However, if this area (irrigated area) is further increased to its maximum possible for sericulture agro-industry, it will provide a scope for double the employment every year with every increase in area under mulberry cultivation.

Estimation of silk cocoon production

Estimation of silk cocoon production involves expenditure incurred for human labour and bullock labour required for maintenance of mulberry garden and layering of silk cocoon. Inputs like manures, fertilizers, irrigation etc. were also considered for working out at different cost concepts. Table 5.12 presents average per hectare cost for the maintenance of mulberry garden and production of silk cocoon in different size groups of mulberry gardens and under different DFLs capacities.

It is seen from Table 5.12 reflects that, the maximum proportion of expenditure under direct cost i.e. cost A was incurred on hired human labour, which was accounting for 37.88 per cent, 36.30 per cent and 36.74 per cent in small, medium and large groups for rearing of silk cocoon. Out of total human labour, rearing of silk cocoon required a significantly higher share than for the maintenance of mulberry garden in almost all groups. This was followed by the expenditure on hired bullock labour in small group accounting for 2.81 per cent, while medium and large group accounted for 2.93 per cent and 2.78 per cent respectively. Among indirect cost or imputed costs rental value of land shared highest and worked out to be 19.94per cent, 22.05 per cent and 23.56 per cent in small, medium and large groups, respectively. These trends were an exception to all other trends i.e. reduction in consumption of inputs with increase in the size of land holding in all the size groups because of the fact that these items had directed correlation with corresponding production silk cocoons and mulberry garden establishment investment. Per hectare Cost A in different size groups was worked out to be Rs.76468.80, Rs.99871.10 and Rs.126764.00 in small, medium and large groups respectively contributing a share of 61.12 per cent, 62.20 per cent and 63.79 per cent respectively of the total cost i.e. cost C.

Table 5.12 Estimation of silk cocoon production **(per hectare)**

Sr. No.	Item	Small group		Medium group		Large group		Overall	
		Unit	Cost in Rs.	Unit	Cost in Rs.	Unit	Cost in Rs.	Unit	Cost in Rs.
1.	Maintenance of garden	82.96	15247.5 (12.19)	125.28	23307 (14.51)	168.68	31530 (15.87)	125.64	23361.50 (14.47)
	Male (Rs.200/day)	56.07	11214 (8.96)	90.30	18060 (11.25)	124.56	24912 (12.54)	90.31	18062 (11.19)
	Female (Rs.150/day)	26.89	4033.5 (3.22)	34.98	5247 (3.27)	44.12	6618 (3.33)	35.33	5299.50 (3.28)
2.	Rearing of of cocoon	255.7	47395 (37.88)	316.25	58296 (36.30)	396.14	73001 (36.74)	322.69	59564.00 (36.89)
	Male (Rs.200/day)	180.8	36160 (28.90)	217.17	43434 (27.05)	271.6	54320 (27.34)	223.9	44638.00 (27.64)
	Female (Rs.150/day)	74.90	11235 (8.98)	99.08	14862 (9.26)	124.54	18681 (9.40)	99.50	14926.00 (9.24)
3.	Bullock labour (@ Rs.500/day)	7.04	3520 (2.81)	9.42	4710 (2.93)	11.06	5530 (2.78)	9.17	4586.67 (2.84)
4.	Manure (Rs.2000/trolley)	1	2000 (1.59)	1.6	3200 (1.99)	2.1	4200 (2.11)	1.56	3133.33 (1.94)
5.	Fertilizer (Rs.850/bag)	2.5	2125 (1.69)	3.1	2635 (1.64)	3.5	2975 (1.49)	3.03	2578.33 (1.59)
6.	DFL (Rs.5/DFL)	100	500 (0.39)	108.20	541 (0.34)	115.6	578 (0.29)	107.93	539.66 (0.33)
7.	Disinfectant (Rs.250/litre)	2	500 (0.39)	2.52	630 (0.39)	3.27	817.50 (0.41)	2.59	649.16 (0.40)
8.	Irrigation charges (Rs.)	-	400 (0.32)		425 (0.26)		460 (0.23)		428.33 (0.27)
9.	Depreciation (Rs.)	-	450 (0.36)		470 (0.29)		490 (0.25)		470.00 (0.29)
10.	Land Revenue (Rs.)	-	30 (0.02)		32.5 (0.02)		36.75 (0.02)		33.08 (0.02)

11.	Interest on Working Capital (Rs.)	-	4303.25 (3.44)		5624.64 (3.50)		7145.49 (3.59)		5690.46 (3.52)
12.	Cost “A1” Rs. (1to11)	-	76468.80 (61.12)		99871.10 (62.20)		126764.00 (63.79)		101035.00 (62.57)
13.	Rental Value Leased in land		0		0		0		0
14.	Cost “A2” Rs (11+12)		76468.80 (61.12)		99871.10 (62.20)		126764.00 (63.79)		101035.00 (62.57)
15.	Interest on Fixed capital (10%)	-	1566.66 (1.25)		1780.00 (1.11)		1954.66 (0.98)		1767.11 (1.09)
16.	Cost “B1” Rs (14+15)		78035.40 (62.37)		101651.00 (63.30)		128718.00 (64.77)		102802.00 (63.67)
17.	Rental value of Land	-	24946.70 (19.94)		35410.80 (22.05)		46819.30 (23.56)		35725.60 (22.12)
18.	Cost “B2” Rs. (16+17)	-	102982.00 (82.31)		137062.00 (85.36)		175538.00 (88.34)		138527.00 (85.79)
	Family: Male (@200/- per day)	42.83	8566.00 (6.85)	36.71	7342.00 (4.57)	20.71	4142.00 (2.08)	33.41	6683.33 (4.14)
	Female (@150/- per day)	14.65	2197.50 (1.76)	10.48	1572.00 (0.98)	6.48	972.00 (0.48)	10.53	1580.50 (0.98)
19.	Subtotal	57.48	10763.50 8.60)	47.19	8914.00 (5.55)	27.19	5114.00 (2.57)	43.95	8263.83 (5.12)
20.	Cost “C1” Rs. (16+19)		88798.90 (70.97)		110565.00 (68.86)		133832.00 (67.35)		111065.00 (68.78
21.	Cost “C2” Rs. (18+19)		113746.00 (90.91)		145976.00 (90.91)		180652.00 (90.91)		146791.00 (90.91)
22.	10 % of Cost C2		11374.60 (9.09)		14597.60 (9.09)		18065.20 (9.09)		14679.10 (9.09)
23.	Cost “C3” Rs. (21+22))		125120.00 (100)		160574.00 (100)		198717.00 (100)		161470.00 (100)

(Figures in parentheses indicates the percentage to cost C_3)

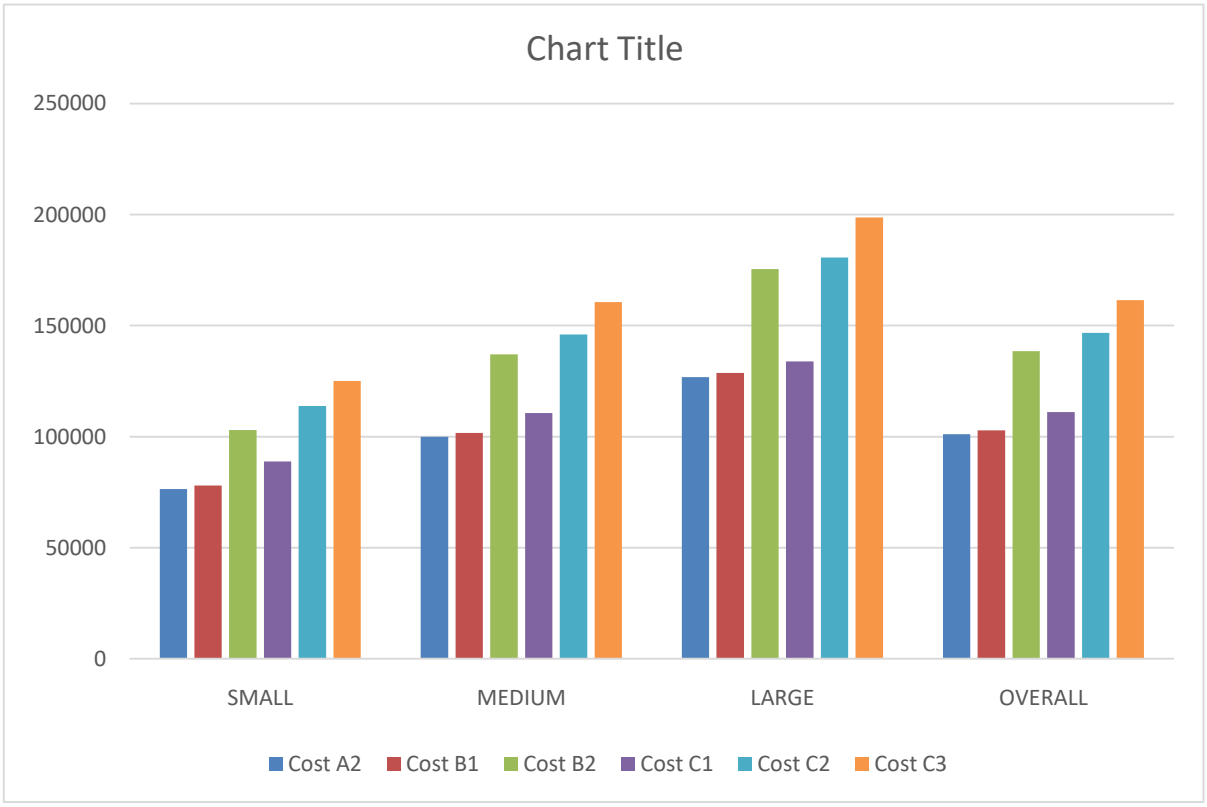

Fig. 6 Estimation of silk cocoon production (Rs/ha)

Cost B_1 and B_2 had its contribution of 62.37 per cent and 82.31 per cent in small group, 63.30 per cent and 85.36 per cent in medium group, while 64.77 per cent and 88.34 per cent in large group. Cost C_3 was worked out to be Rs. 125120, Rs. 160574 and Rs. 198717 per hectare in small, medium and large groups respectively.

In general, a decreasing trend of input consumption from hired bullock labour, manure, fertilizer and irrigation were recorded, similar trend was also noticed for contribution of family labour in these activities.

Overall average expenditure at Cost A_2, B_1, B_2, C_1, C_2 and C_3 was Rs. 101035, Rs. 102802, Rs. 138527, Rs. 111065, Rs. 146791 and Rs. 161470 per hectare. Contribution of Cost A_2 and Cost B_2 to Cost C_3 was 62.57 per cent and 85.79 per cent respectively. Highest share of expenditure in direct cost was for the item of hired human labour for rearing of cocoon and maintenance of garden which accounted for 36.89 per cent and 14.47 per cent respectively, out of which majority of share i.e. percentage of total cocoon requirement was attributed from rearing silk cocoon process only. Bullock labour and Interest on working capital accounted 2.84 per cent and 3.52 per cent ranking as second and third level under direct cost. Rental value of land accounted highest share for 22.12 per cent under indirect cost.

IV. (A) Production from mulberry garden

Mulberry garden is essential aspect of cocoon rearing agro-industry as it provides feeding material i.e. mulberry leaves to larvae throughout its life period i.e. generally for 15 years. As fresh leaves are needed every day, the raising of mulberry garden has become part and parcel of silk cocoon rearing activity and governs great value.

Production of mulberry leaves during each instar was worked out from different size of mulberry garden and is presented in Table No. 5.13

Table 5.13 Production of mulberry leaves (in qtls/ha)

At the end of rearing	Small	Medium	Large	Average
I	184.56	214.80	295.17	231.51
II	192.85	242.50	307.05	247.46
III	210.00	260.55	317.92	262.82
IV	210.00	267.61	330.45	269.35
V	190.91	258.70	309.15	252.92
Total	988.32	1244.16	1559.74	1264.07

(Gross estimated returns are worked out @ Rs.100 per quintal.)

It is observed from Table 5.13 reflects that, on an average per hectare 1264.07 qtls of mulberry leaves per hectare were obtained. Highest leaves production was recorded in large group whereas, lowest production was recorded in small group, the corresponding figures were 1559.74 qtls and 988.32 qtls per hectare respectively.

Economics of mulberry leaves production (cost and returns)

It is observed from Table 5.14 reflects estimated cost and returns that would have been available to farmer had not grown mulberry garden and would have purchased mulberry leaves for feeding to layers.

Estimated cost and return indicate that by growing mulberry garden by farmers under different size groups incurred cost at different concepts (as illustrated in column third of above table). By incurring an average cost of Rs. 33214.76, Rs. 34981.87, Rs. 56016.67, Rs. 38625.20, Rs. 59660.01 and Rs.65626.01 per hectare at cost A_2, B_1, B_2, C_1, C_2 and C_3, respectively, farmers harvested 1264.07 qtls of mulberry leaves, value of which was estimated tune of Rs.126407 per hectare, giving net returns in the form of saving to the tune of Rs. 93192.57, Rs. 91425.47 Rs. 70390.66, Rs. 87782.13, Rs. 66747.33 and Rs. 60781.33 per hectare at Cost A_2, B_1, B_2, C_1, C_2 and C_3 respectively. The necessity of having a mulberry garden for rearing silk cocoon industry which helps to harvest fabulous income (in the form of saving) by the silk industry, and in absence of which silk cocoon industry would never has been in profitably.

Table 5.14 Estimated cost and return from mulberry leaves (in Rs. /Ha.)

Sr. No.	Particulars	Small	Medium	Large	Overall
1.	Gross Returns	98832	124416	155974	126407
2.	**Cost of Cultivation at**				
	Cost "A1"	19719.00	30574.90	49350.40	33214.80
	Cost "A2"	19719.00	30574.90	49350.40	33214.80
	Cost "B1"	21285.70	32354.90	51305.00	34981.80
	Cost "B2"	37727.70	53058.40	77263.90	56016.70
	Cost "C1"	29485.70	35084.90	51305.00	38625.20
	Cost "C2"	45927.70	55788.40	77263.99	59660.00
	Cost "C3"	50520.40	61367.30	84990.30	65626.00
3.	**Net Return at**				
	Cost "A1"	79113.00	93841.07	106623.70	93192.57
	Cost "A2"	79113.00	93841.07	106623.70	93192.57
	Cost "B1"	77546.34	92061.07	104669.00	91425.47
	Cost "B2"	61104.34	71357.57	78710.07	70390.66
	Cost "C1"	69346.34	89331.07	104669.00	87782.13
	Cost "C2"	52904.34	68627.57	78710.07	66747.33
	Cost "C3"	48311.57	63048.73	70983.68	60781.33

(B) Production of Cocoons and by products

Cocoon production in silk industry is the main product from which silk yarn is produced. All the DFLs undergo resting stage after it has attended about 20 to 25 days growth period. During this resting stage layers produce protein fiber for spinning cocoon, to provide a protective casing. Final stage of cocoon is reached within month, each life cycle of DFL is treated as one rearing. The production of cocoon in physical and monetary unit as well

as production of by-product i.e. manure and cuttings is presented in Table 5.15.

It is seen from Table 5.15 that, the production of cocoons was the major item of income source which accounted for 95.83 per cent, 92.07 per cent and 91.31 per cent of the total income per gross income in small, medium and large groups respectively. The respective cash receipts in these groups from the sale of cocoons was worked out to be Rs. 143620, Rs. 195800 and Rs. 256716 per hectare respectively. Total cocoon production during all instars was observed to be 359.05 kg, 489.50 kg, 641.79 kg per hectare in small, medium and large group respectively.

Silk cocoon growers also enjoyed income from by products like manure and sale of cuttings. The receipt from sale of cutting had significant contribution of 4.16 per cent, 7.93 per cent and 8.61 per cent of the total receipt in small, medium and large group respectively. Total gross receipts per hectare in small, medium and large group was worked out to be Rs. 149860, Rs. 212660 and Rs. 281136 respectively. Cultivators of medium group harvested Rs. 62800 per hectare as an additional gross income over small group, whereas, large group cultivators harvested Rs. 68476 per hectare for the same. On an average 496.78 kg of cocoon production fetching Rs. 198712 per hectare was obtained which contributed a significant share of 94.64 per cent in gross income. This was followed by receipt from the sale of cuttings which accounted for Rs. 15840 per hectare having a share of 7.38 per cent in gross income.

Average gross income in silk cocoon process from all sources i.e. product and byproduct were found to be Rs. 214552 per hectare.

Table 5.15 Returns obtained from silk cocoon **(in Rs.)**

Sr. No.	Items	Small		Medium		Large		Overall	
		Yield in (Kg)	**Receipt (Rs.400)**	**Yield in (Kg)**	**Receipt (Rs.400)**	**Yield in (Kg)**	**Receipt (Rs.400)**	**Yield in (kg)**	**Receipt (Rs.400)**
A	Main production Cocoon (At the end of)								
1.	1st rearing	70.97	28388	95.50	38200	125.90	50360	97.45	38982.67
2.	2nd rearing	72.50	29000	96.70	38680	129.90	51960	99.70	39880.00
3.	3rd rearing	72.50	29000	98.90	39560	130.91	52364	100.77	40308.00
4.	4th rearing	72.50	29000	98.90	39560	128.20	51280	99.86	39946.67
5.	5th rearing	70.58	28232	99.50	39800	126.88	50752	98.98	39594.67
	Total Production (A)	**359.05**	**1,43,620** (95.83)	**489.50**	**195800** (92.07)	**641.79**	**256716** (91.31)	**496.78**	**198712.00** (92.62)
B	By product Manure (in qtls)	**In Qtls**	**(Rs.6000/qtl)**	**In Qtls**	**(Rs.6000/qtl)**	**In Qtls**	**(Rs.6000/qtl)**	**In Qtls**	**(Rs.6000/qtl)**
1.	1st rearing	0.20	1200	0.55	3300	0.76	4560	0.50	3020.00
2.	2nd rearing	0.22	1320	0.55	3300	0.78	4680	0.51	3100.00
3.	3rd rearing	0.22	1320	0.57	3420	0.83	4980	0.54	3240.00
4.	4th rearing	0.22	1320	0.56	3360	0.85	5100	0.54	3260.00
5.	5th rearing	0.18	1080	0.58	3480	0.85	5100	0.53	3220.00
	Total B	**1.04**	**6240** (4.16)	**2.81**	**16860** (7.93)	**4.07**	**24420** (8.61)	**2.64**	**15840.00** (7.38)
	Gross receipt (A + B)		**1,49,860** (100)		**212660** (100)		**281136** (100)		**214552.00** (100)

Economics of rearing of silk cocoon

Data through Table 5.16 presents that gross income was highest in large group which worked out to Rs. 281136 per hectare leaving behind maximum net returns of Rs. 154372, Rs. 152418, Rs. 105598, Rs. 147304, Rs. 100484 and Rs. 82419.20 at Cost A_2, B_1, B_2, C_1, C_2 and C_3 respectively. A trend of decrease in net returns and forwarding towards Cost C_3 was noticed in almost all groups. This fact was natural because, the cost increases towards Cost C_3.

Table 5.16 Economics of rearing of silk cocoon (in Rs. /ha)

Sr. No.	Particulars	Small	Medium	Large	Overall
1	Gross Returns	149860	212660	281136	214552
2	**Cost of Cultivation at**				
	Cost "A1"	76468.80	99871.10	126764.00	101035.00
	Cost "A2"	76468.80	99871.10	126764.00	101035.00
	Cost "B1"	78035.40	101651.00	128718.00	102802.00
	Cost "B2"	102982.00	137062.00	175538.00	138527.00
	Cost "C1"	88798.90	110565.00	133832.00	111065.00
	Cost "C2"	113746.00	145976.00	180652.00	146791.00
	Cost "C3"	125120.00	160574.00	198717.00	161470.00
3	**Net Return at**				
	Cost "A1"	73391.30	112789.00	154372.00	113517.00
	Cost "A2"	73391.30	112789.00	154372.00	113517.00
	Cost "B1"	71824.60	111009.00	152418.00	111750.00
	Cost "B2"	46877.90	75598.00	105598.00	76024.70
	Cost "C1"	61061.10	102095.00	147304.00	103487.00
	Cost "C2"	36114.40	66684.00	100484.00	67760.90
	Cost "C3"	24739.90	52086.40	82419.20	53081.80
4	**Output input ratio at**				
	Cost "A1"	1.95	2.12	2.21	2.12
	Cost "A2"	1.95	2.12	2.21	2.12
	Cost "B1"	1.92	2.09	2.18	2.08
	Cost "B2"	1.45	1.55	1.60	1.54
	Cost "C1"	1.68	1.92	2.10	1.93
	Cost "C2"	1.31	1.45	1.55	1.46
	Cost "C3"	1.19	1.32	1.41	1.32

Input output ratio indicates returns obtained per Rs. Of investment. The same table also reflects input output ratio at different cost concepts through which it is gained that maximum ratio 2.21 was obtained in large group at Cost A. Whereas, 2.12 was obtained on average basis at the same cost. The ratio obtained at Cost C_3 was 1.19, 1.32 and 1.41 in small, medium and large group respectively.

Table 5.17 Constraints faced by farmer in sericulture production and marketing

Sr. No.	Problems	No. of Farmer (N=60)	Percentage
1.	Low yield Cocoon production in summer season	30	50.00
2.	High wage rates of labours	42	70.00
3.	Lack of knowledge about improved method of rearing	43	71.66
4.	Fluctuation in temperature and humidity leads to occurrence of disease of silkworm	24	40.00
5.	Regular break for electricity supply	20	33.33
6.	Less water available for irrigation	40	66.66
7.	High cost of cultivation	32	53.33
8.	Lack of skilled labour for rearing of silkworm	40	66.66
9.	Lack of control measure for controlling disease of silkworm	35	58.33
10.	Lack of market information	40	66.66
11.	Inadequate market facilities	50	83.33
12.	Lack of credit facilities	48	80.00
13.	More transportation cost for transport of cocoon to distant market	37	61.66

The table 5.17 reveal that major constraints faced by maximum farmers while production waslack of knowledge about improved method of rearing i.e. 71.66 per cent, followed by high wage rates of labours i.e. 70 per cent. Less water available for irrigation along with lack of skilled labour for rearing of silkworm accounts 66.66 per cent.

Whereas, major constraints while marketing was inadequate market facilities and lack of credit constituting 83.33 per cent and 80.00 percent respectively, followed by lack of market information and transportation cost i.e. 66.66 per cent and 61.66 per cent respectively.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Sericulture is most important and economically viable activity based on agriculture having vast potentiality for employment. Considering the demand for silk and employment potential of this allied agriculture activity, it was felt necessary to work out economics of sericulture, therefore the research work having title as “Economic analysis of sericulture in Washim district” was selected for the study.

The objectives of this research work were

i) To estimate the cost and returns of sericulture.

ii) To examine the employment generation from sericulture.

iii) To study the constraints faced by sericulture growers.

Keeping in view the profitability of silk cocoon rearing the farmer interests in diversifying towards mulberry plantation from normal cropping pattern was increasing resulting in increased area under mulberry plantation. However, farmers undertaking mulberry plantation were scattered and mostly found in Washim districts, and hence 60 farmers undertaking mulberry plantation and sericulture were selected purposively for present study. The data pertaining for the year 2018-19 were collected through questionnaire specially designed to get information as per objectives of this research work.

The average gross cropped area of selected mulberry growers was 6.27 ha out of which 13.39 per cent is under mulberry plantation, and the overall labour force involved for establishment of one hectare of mulberry garden is 112.68 labour human days and 19.48 bullock labour days.

Establishment cost incurred on per hectare basis was maximum in large group, which worked out to be Rs. 84990.30 per hectare at Cost C_3. Expenditure on hired human labour was highest in large and medium group whereas expenditure on bullock labour was highest in small group and worked out to be 26.18 per cent, 17.63 per cent and 11.87 percent

respectively. Establishment cost was spread over a life period of mulberry garden for 15 years treated as garden establishment cost.

Maintenance cost of mulberry garden and expenditure required for rearing of silk cocoon indicated that maximum expenditure in almost all groups was required for human labour in rearing of silk cocoon and was to the tune of 50.07 per cent in small group, 50.81 per cent in medium group and 52.61 per cent in large group. Rental value of land is maximum in large group which worked out to be 23.56 per cent of the total cost. Overall cost A_2, B_1, B_2, C_1, C_2 and C_3 were worked out to be Rs. 101035, Rs. 102802, Rs. 138527, Rs. 111065, Rs. 146791, Rs. 161470 per hectare respectively.

Total 374.3 male days and 186.59 female days per hectare were required for establishment and maintenance of one hectare of mulberry garden and for rearing of silk cocoons. Thus, as much as 560.89 human labour could be engaged in silk industry over a period of one year indicating a scope for confirmed employment of one male and one female labour throughout the year. However, if the irrigated area in Washim district is further increased to its maximum possible for sericulture agro industry, it will provide a scope for double employment every year with the increase in area under mulberry cultivation.

988.32 quintal in small group, 1244.16 quintals in medium group and 1559.74 quintals in large group, mulberry leaves were harvested from mulberry garden and fed to layers during the period of 5 rearings in a year.

From 5 rearings, small group farmers obtained 359.05 kg cocoon yield on per hectare basis. Medium grouped farmers obtained 489.50 kg cocoon yield. Whereas large grouped farmers had 641.79 kg of cocoon yield. On an average 496.78 kg of cocoon yield was harvested.

Estimated cost and return from mulberry leaves indicated that maintenance of mulberry garden and rearing of silk cocoon process was most interdependent and mulberry compensated nearly 50 percent of total expenditure.

Per hectare cost and return for rearing of silk cocoon indicated that on an average Rs. 214552 were obtained as gross receipts considering main product and by product leaving behind Rs. 113517, Rs. 111750, Rs. 76024, Rs. 103487, Rs. 67760.90 and Rs. 53081.80 at cost A_2, B_1, B_2, C_1, C_2 and C_3 respectively.

Maximum input output ratio was found in large group as 2.21 at cost A which was further reduced to 1.41 at cost C_3.

CONCLUSIONS:

(i) Per hectare cost of cultivation for rearing of silk cocoon at cost C_3 was highest in the large group i.e. Rs. 198717 followed by medium group Rs. 160574 and small group Rs. 125120. The average yield and gross returns per hectare increased with the increase in size of farms.

(ii) The benefit cost ratio of sericulture at cost 'C_3' was 1.19 in small group, 1.32 in medium group and 1.41 in large group. This indicates that, rearing of silk cocoon was economically profitable.

(iii) In general rearing of silk cocoon above 200 DFLs and area more than 0.40 hectare was found highly profitable venture and having high potentiality for employment of human labour to the tune about 560.89 labour days per hectare during the year.

(iv) The major constraints faced by maximum farmers were inadequate market facilities and lack of credit constituting 83.33 per cent and 80.00 per cent respectively. Followed by lack of knowledge about improved method of rearing i.e. 71.66 per cent and high wage rates of labours i.e. 70 per cent.

POLICY IMPLICATIONS:

Sericulture is a profitable venture. Hence there is need to take initiatives to ensuring the fair prices to the silk cocoon rearers.

CHAPTER VII

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VITA

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Place: Akola

Date: / /2020

Signature of Student

QUESTIONNAIRE

INTERVIEW SCHEDULE

POST GRADUATION INSTITUTE, AKOLA

ECONOMIC ANALYSIS OF SERICULTURE IN WASHIM DISTRICT

I) General information

1) Name of Cultivator:
2) Village:
3) District:
4) Tahsil:
5) Education:
6) Occupation:
7) Age:
8) Total Family Members: a. Male:
   b. Female:
   c. Children:

II) Land Use Pattern

1) Total owned land:
2) Current fallow land:
3) Permanent fallow:
4) Total cultivated land:
5) Area sown more than ones:
6) Gross Cropped area

III) Cropping Pattern:

Sr. No.	SEASON	CROP	VARIETY	Total Area in (ha)
1.	Kharif	I. II. III. IV.		
2.	Rabi Total	I. II. III		
3.	Summer	I. II.		
	Total			

IV) Establishment of mulberry garden (1st year)

a) Area under garden (ha):

b) Variety:

c) Rainfall / Irrigated:

d) Year of month of planting:

e) System of planting:

f) Expected life of mulberry garden:

g) Wage rate (Rs.)

1. Male:
2. Female:
3. Children:

V) Implements and Machinery:

Sr. No.	Items	No./ Types	Present value	Life Span	Repairing / Maintainance (Rs.)
1.	Rearing house				
2.	Room for keeping chandrikas				
3.	Rearing stand				
4.	Rearing trays				
5.	Poles for stand				
6.	Ant wall				
7.	Sylon nets				
8.	Paraffin paper				
9.	Rubber foam				
10.	RKO powder				
11.	Chopping stand				
12.	Chopping knife				
13.	Net				
14.	Bamboo mintages				
15.	Jut gunny bags				
16.	Chandrikas				
17.	Thermometer				
18.	Hygrometer				
19.	Lime powder				
20.	Formalin				
21.	Secator				
22.	Raw cotton				
23.	Air cooler				
	Total				

VIII) Inputs used in Maintenance of Garden:

Sr No.	Item	Farm Produced	Purchased	Total
1.	F.Y.M			
2.	Fertilizer			
3.	Irrigation/ Oil/ Electrical			
4.	Others			
	Total			

IX) Cost of Silkworms Rearing (per generation)

1) Silk labour wages (Rs.):
2) No. of hrs. of work:
3) Labour used:
4) Wage rates:
   a) Male:
   b) Female:
5) No of rearing:

Sr. No.	Operation	No. of Rearing								Total Labour Unit	
		I		II		III		IV			
		MF	HF	MF	HF	MF	HF	MF	HF	MF	HF
1.	Silk seed procurement										
2.	Harvesting of leaves										
	a) End of 1st instar										
	b) End of 2nd instar										
	c) End of 3rd instar										
	d) End of 4th instar										
	e) End of 5th instar										

3.	Feed and Bed Clearing										
4.	Collection and maintaining of ripened worms										
5.	Harvesting of Cocoon										
6.	Preparation for marketing										
7.	Transportation										
8.	Other										
	Total										

XII) Cocoon production: -

Sr. No.	**Rearing**	**No. of egg card**	**Total cocoon**	**Cocoon wt (kg)**	**Cocoon rate/ kg**	**Production in (Rs.)**
1.	1st rearing					
2.	2nd rearing					
3.	3rd rearing					
4.	4th rearing					
5.	5th rearing					

XIII) Silk Production: -

Sr. No.	**No. of Cocoon**	**Wt. of cocoon**	**Total silk wt.**	**Silk rate / kg**	**Gross production**	**Profit**
1.	100cocoon					
2.	150 cocoon					
3.	250 cocoon					
4.	350 cocoon					
5.	500 cocoon					

XIV) Problems faced by farmers: -

Sr. No.	Problems	No. of farmers	Percentage	Rank
1.	Low yield in summer season			
2.	Lack of knowledge about improved method of rearing			
3.	high wage rates for labourers			
4.	Fluctuation in temperature and humidity leads to occurrence			
5.	Complete failure of silkworms due to disease attack			
6.	Lack of skilled labourers for picking haves			
7.	Non-availability of labourers for picking haves			
8.	Lack of control measures for controlling dsease of silkworms			
9.	Inadequate market facilities			
10.	High cost of cultivation			
11.	Non-availability of chemicals at the required time			
12.	Lack of credit facilities			
13.	Inadequate transport facilities			