“Economic Analysis of Yield Gap and Constraints in Sericulture Cocoon Production in Mandla District of Madhya Pradesh.”

THESIS

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By

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CERTIFICATE – I

This is to certified that the thesis entitled "economic analysis of yield gap and constraint of sericulture cocoon production in Mandla district of Madhya Pradesh" submitted in partial fulfilment of the requirement for the degree of ***MASTER OF SCIENCE*** *in* ***Agril. Economics and Farm Management*** *of Jawaharlal Nehru Krishi Vishwa Viddylaya, Jabalpur is a record of the bonafide research work carried out by* ***Ms. Riti Tiwari*** *under my guidance and supervision. The subject of the thesis has been approved by the Student's Advisory Committee and the Director of Instruction.*

No part of the thesis has been submitted for any other degree and diploma (Certificate awarded etc.) or has been published part has been fully acknowledged. All the assistance and help received during the course of the investigation has been acknowledged by him.

Dr. P. K. Awasthi

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THESIS APPROVED BY THE STUDENT'S ADVISORY COMMITTEE

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CERTIFICATE – II

This is to certified that the thesis entitled " economic analysis of yield gap and constraint in sericulture cocoon production in Mandla district of Madhya Pradesh" submitted by ***Ms Riti Tiwari*** *to Jawaharlal Nehru Krishi Vishwa Viddylaya, Jabalpur of the requirement for the degree for degree of Master of Science in* ***Agriculture*** *in the Department of* ***Agril. Economics and Farm Management*** *has been, after evolution, approved by the External Examiner and by the Student's Advisory Committee after an oral examination on the same.*

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Head of the Department (Dr. N. K. Raghuwanshi) …..……..

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Place : Jabalpur ***RITI TIWARI***

Date : …./…./2012

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CHEPTER- I

INTRODUCTION

1.1 The problem

India is mainly an agriculture based country, with 63 per cent of its population dependent on agriculture for their livelihood. Further, about 70 per cent of the people live inv rural areas and more than 35 per cent of the rural population still live below the poverty line. In India, the small sized holdings of a large proportion of farmers' are considered as one of the main factors causing rural poverty and barrier in agricultural growth. Under the programme of MANREGA Government of India is promised to provide employment guarantee to one person from each family of below poverty line in the rural areas. Further, in order to control migration of rural poor to urban places, Government of India has been encouraging regular income and employment oriented farming occupation, one such potential farming is sericulture.

Sericulture activities has its own historical importance, it was well to common men since 126 B.C. further evidence is mythological literature e.g Ramayan , Mahabharat etc. Basically It is a gainful land use activity with agro-forestry base, which generate avenues of employment in rural areas. Its organizational set-up is industrial in nature, leading to the promotion of many subsidiary cottage and village industries, which provide supplementary employment in the rural areas during the lean agriculture period. The two activities under sericulture include forest base tasar cocoon production from Saja & Arjuna trees and agro-based mulberry cocoons production

Sericulture is an important agro based rural industry with enormous potential for generating employment through which the living standard of the people could be improved. It also earns a

handsome amount of foreign exchange for the country. Silk is superior to other textile fibres in qualities like durability, lustre and low weight. Hence, it is regarded as the “Queen of textiles”.

India is the only country in the world that produces all four types of silk, viz., mulberry, tasar, eri and muga. 88.60 per cent of the country’s total silk production is the mulberry type, the term sericulture normally refers to mulberry sericulture. Out of 16500 M.T of the country’s total raw silk production, 14620 M.T was of the mulberry type, While, eri, muga and tasar silks accounted for 8.7, 0.65 and 1.9 per cent of total production respectively (Annonymous, 2005). The country has a monopoly in muga , the golden yellow silk and is one of the leading producer of tasar silk in the world.

India is second largest mulberry silk producing country after the China in the world accounting for 19 per cent of the total global raw silk production. In India, during 1980 mulberry area was just 1.55 lakh hectares, it increased to 1.85 lakh hectares during 2004 and silk cocoon production slightly decreased to 1.17 lakh tonnes. During 2009-10, India had produced 16,360 metric tonnes of raw silk.

Mulberry cultivation, concerned with the production of silk, is divided into five phases, viz., and cultivation of mulberry, silkworm seed production, rearing of silk worms, reeling of raw silk and weaving of silk. Cultivation of mulberry and rearing of silk worms are farm based activities managed by the silk cocoon producers. Mulberry leaf is the host plant for mulberry silk worm. It is possible to harvest three to four crops per year in Madhya Pradesh. Mulberry leaves form the major share of the cost of cocoon production. Production of silk depends upon the quantity and quality of the mulberry leaves produced, and in turn, on cocoons produced.

India is producing at present two kinds of tasar silk i.e. (1) Oak tasar or temperate tasar (Chinese variety) and (2) Indian tradition tasar or tropical tasar. The first variety recently introduced one confined to sub-Himalayan region which is still under exploitation. Production of Oak tasar silk on commercial scale is yet to come. Second variety is the Indian traditional tasar which is produced by the silkworm *A. mylitta, D.India* is having the monopoly in producing the above variety of tasar which is confined to tropical Zone of India where tropical forests exist.

India is the second largest producer of tasar silk after China and eams about 14 to 15 crorers of foreign exchange annually amounting to 2 to 3% of total silk export earning. India produces 1166 million tonnes of tasar silk during 2009-10. Tasarculture is practiced by one lakh forty thousand tribal families in Jharkand. Bihar Orissa, Chhattisgarh, Madya Pradesh, West Bengal, Andhra Pradesh. U.P. and Maharashtra. It gives gainful employment and attractive additoinal income to the tribals. However, for silk yarn and fabric production non tribals are involved.

Sericulture industry provides employment to millions of rural people in India. The majority of them belong to the below poverty sections of the society, as well as to scheduled castes, scheduled tribes and adivasis. Sericulture in India has turned out to be a highly remunerative enterprise with minimum capital base and yielding reasonably good returns vis- a-vis other enterprises. It is one of the most stable enterprises which provides regular income to the cultivators of the country throughout the year. It provides not only periodical return within a short period of time but also increases family employment opportunities.

Silk is an export oriented product and is exported to more than 50 countries like USA, U.K., Italy, UAE and Saudi Arabia. Some European and Asian countries are main buyers of Indian silk. Exports for 2004-05 touched an all time record of

Rs.2879.56 crore. The foreign exchange earnings from the export of silk are also increasing in the recent years. It was reported that the country earned Rs.2892.44 crores from the export of silk goods during 2009-10.

In M.P. special projects for the beneficiaries of Mulberry, Tasar and Eri culture would be prepared under the scheme to achieve the objective of Socio-Economic Development. These projects will be taken up in partnership with National and International agencies with DFID, UNDP and CSB etc. on the basis of sharing of resources. A large number of labour is employed in all the sericulture activities and this industry become a boon to the labour income in India. Sericulture also provides employment to women labour. The women participation in sericulture ranges between 50 and 60 percent. The year 1994 was observed as “The Year of Women in Sericulture”.

Madhya Pradesh produced 752 tonnes of cocoon of mulberry silk harvested in 3281 acres and 700 lakh cocoon of tasar silk during year 2009-10. Madhya Pradesh ranks 3rd in non- traditional states of India. Sericulture industry of M.P. gives employment to 24598 No. of families in mulberry silk culture and about 10000 families in Tasar culture during 2009-10.

Yield gap refers to the difference between the potential yield (Research Station Yield) and actual farm yield (realised on the farmers’ field).The estimated yield gaps ranged from 30 to 300 per cent. Causes of this yield gaps are varying resource management and cultural practices. Through proper application of inputs at the recommended levels and better management practices we can decrease the level of yield gap. It is apparent that for the success of new production technologies, proper resource mix and appropriate cultural practices become prerequisites.

The yield gap analysis is a potent research technique that has been introduced in the 1970s. Developed by the International Rice Research Institute (IRRI), it is extensively used to measure and analyse determinants of the yield gaps. The concept of yield gap provides the information base in this regard .The findings of such research have many implications for policy formulation, aimed at alleviating the constraints causing the yield gaps.

Yield gap is the difference between the maximum attainable yield and farm level yield. Maximum attainable yield is the yield of experimental or non farm plot with no physical, biological and economic constraints and with known management practices at a given time and in a given ecology. Farm level yield is the average farmers yield in a given area at a given time in a given ecology Yield gap has two components Gap-I and Gap-II. The first component cannot be narrowed or is not exploitable because it is mainly due to factors that are non – transferable such as environmental conditions. A gap or difference is also observed between the potential farm yield, (defined as the highest yield that can be obtained on farmers' fields, using modern technology) and the actual. This gap, called Gap-II. The second component is mainly due to difference in management . practices. Yield gap II is manageable and can be bridged by deploying more efficient research and extension services. This non-optimal use of improved practices may be due to inefficient or inadequate extension activities, besides other physical or socio-economic factors affecting the farming community in the area. It is this gap that is the focus of this study.

Though the production level has increased to a great extent in the recent past; still there exists a wide gap between the actual yield obtained by the rearers and the production level actually possible with the existing modern technology. In the agricultural sector, sericulture sector, such yield gap can be observed. Hence, the crux of the problem of growth in agriculture as well as

sericulture is how to increase the output per unit of input and thereby reduce these gaps.

One way of over coming the problem and increasing production is to adopt modern inputs and improved technology of production within the farms and examining how efficiently the farmers are using their resources. Even though the cocoon yield level has increased, there still exists a gap between what is achieved and what could be achieved in cocoon yield among the rearers. The general belief is that, the silkworm rearers are not fully exploiting their resources in order to achieve higher yields. Therefore, an attempt is made to analyse the magnitude of the gaps in attainable cocoon yields and to explore the possibilities.

1.2 The Significance and Scope of the Study

The present study confined to Mandla district of Madhya Pradesh which is represented percent of the total geographical area of the state. The nature of the study is both positive and normative and it is sought to diagnose the sericulture enterprise regarding the production performance, cost and return, yield gape and constraints as well as employment generation. Such study is essential to assess the yield gaps and extent of income and employment generation through cocoon production so that the hidden obstacle in the development of the sericulturists community could be focussed in some definite term and some suggestible suggestion could be given.

1.3 SPECIFIC OBJECTIVES

- To study the trends and growth rate of mulberry and tasar cocoon production in Mandla district
- To analyse the comparative cost and returns of mulberry and tasar cocoon production
- To quantify the yield gaps and identify the constraints in cocoon production
- To suggest appropriate policy measures for the development of sericulture in study area

1.4 Limitation

1. Since the sericulturists in the study area cultivate mulberry leaves so the price of mulberry leaves is highly competitive and varies depending on factors like environment and management practices. Hence, it was found necessary to value the mulberry leaf on the basis of actual cost of cultivation. The cost of cultivation represents the implicit cost. Hence it was preferred for data obtained regarding the cultivation price of leaf. The mulberry leaf price varies with the season and hence the cultivation price was elicited specifically for the last crop.
2. Since the tasarculturists in the study area, neither cultivates Arjun plant nor purchases the levees of tasar. They leased for the land in forest area from the government and maintain the plantation. Hence, it was found necessary to value the Arjun leaf on the basis of maintenance the plantation and sanitation measures. The maintenance cost varies with the season and hence the cultivation price was elicited specifically for the last crop.
3. The month to month wide variation in yield is a common phenomenon observed in mulberry crops and silk cocoon production. The major factors influencing this phenomenon include: 1) climatic variations, 2) occurrence of pest and diseases, 3) variations in inputs used and quality of mulberry leaf grown and fed to the silkworms. The average yield of only three cocoon crops of three seasons were considered in the study and the study has not taken into account the extent of variations caused by these factors on the productivity levels.
4. The actual prices realised by sericulturists during December, 2011 and January, 2012 were used in converting production figures from quantities to value term, although the prices realised would be different from crop to crop.

Plan of the Study

The study has been presented in six chapters. Chapter-1 outlines the problems in of sericulture enterprise, brief history, the Significance and Scope of the Study, specific objectives and limitations of the present study.

Chapter-2 deals with profile of Mandla District, population and demography of Mandla district, climate, rainfall and soil type and land use pattern in Mandla district Chapter-3 briefly looks at the relevant studies conducted on trends, costs and returns, yield gaps and constraints in sericulture and other crops.

Chapter-4 comprises the methodology followed in the sampling design, the concepts used and the method of evaluation of inputs. The characteristics of the functional forms used in the analysis have also been explained.

Chapter-5 presents the results and discussion obtained from the study in tabular forms, accompanied by explanatory notes. While discussing the results of the study and attempts to discern the cause-effect relations possibly existing therein. The results are also discussed in comparison with other relevant studies wherever possible

Chapter-6 presents the summary of the results of the study and explains how far the objectives of the study have been fulfilled. It also puts forward the relevant policy implications.

CHEPTER- II

AGRICULTURAL ECONOMY OF MANDLA DISTRICT

Mandla District

Mandla district is located at east central part of Madhya Pradesh. Mandla district lies between the latitude 22 degree 2 minutes and 23 degree 22 minutes north and longitude 80 degree and 18 minutes and 81 degree and 50 minutes in east. The tropics of the cancer passes through the north of the district.The extreme length of the district is about 133 Kms. from north to south and extreme breadth is 182 Kms from east to west. It covers a total area of 8771 Sq.Km. and consists a total population of 779414. . It is bounded by the district of Jabalpur to the north, the district of Dindori to the east, Balaghat district to the south and Seoni district to the west. Since the district is surrounded by the Narmada river, most of it lies in the river's basin.

Population and Demography of Mandla District

There are 4 Tehsils namely Mandla Niwas Bichiya and Mavai and 1214 villages in the district. Mandla district of Madhya Pradesh which comprised of 9 blocks namely Mandla, Bichiya, Nainpur, Niwas, Narayanganj, Bijadandi, Ghughari, Mavai, and Mohgaun.

Table 2.1 Population and Demography of Mandla District

Total Population	Female-Male Ratio	SC Population	ST Population	SC % in Total population	ST % in Total Population
894236	1002	41305	511798	4.62	57.23
Population Increment Ration in 10 Year	**Total Literacy**	**Percentage of Literacy**	**Geographical Area(In KM)**	**Janpad Panchayat**	**Gram Panchayat**
14.66	448979	59.85	8771	9	472

Mandla is a tribal district situated in the east-central part of Madhaya Pradesh. The district lies almost entirely in the catchment of river Narmada & its tributaries. A district with a glorious history, Mandla comprises of numerous rivers and endowed with rich forests. The world's famous Tiger Sanctuary, Kanha National Park located in the district, is one of the hottest targets for both the domestic as well as foreign tourist**.**

Climate, Rainfall and Soil type

Annually the region receives a high level of rainfall,1279.90mm of rainfall, mostly during the June to September monsoon period. The four main seasons of the area are; winter (December to February), summer (March to mid-June), South-West monsoon (mid June to September), and post- or retreating-monsoon (October to November). As the district extend over the highest plateaus of the Satpura ranges (from 443- 887m above sea level), it is relatively cool in comparison to low lying plains to the North and South with similarity to temperate climate. This is despite the fact it is situated in the tropical climatic zone. January records the coldest temperatures with an average daily maximum of 26.0°C and minimum of 7.8°C. May is typically the hottest month with a daily maximum averaging 41.3°C and reaching 44°C at a high. The minimum temperature during this month averages 24.4°C.

The gently sloping lands of Mandla primarily hold mixed red and black type soils, falling under the world soil classification of "Brown earths". These soils develop from granite gneiss and quartzite schist complexes and are of a rather deep yellow, brown and red colour. The texture includes coarse to medium in texture 'A' horizon and fine in texture 'B' horizon. Other soils in the area include black cotton soil existing in low-lying areas, and alluvial soil along nalas and streams. Due to weathering, the soil on sloping areas is shallow while in the plains it is quite deep.

Land Use Pattern in Mandla District

Geographical area of Mandla district is 467250 hectares, out of which the net cultivable area was 215600 hectares; the total cultivated area is 280500 hectares comprises with 18840 hectares under kharif season and 92100 hectares in rabi season. The total irrigated area was 38900 hectares.

The main food crops were paddy (11300 ha), kodo and kutki (37000 ha) in kharif season and wheet(34400 ha) in rabi season. Among the commercial crops maize (18200 ha), niger (8300 ha), mustard (15200 ha) and sugarcane (3000 ha) were more popular.

Table 2. 2. Land Use Pattern in Mandla District

(a) Bsic Information of Mandla District

S. No.	Particular	Area-000 hectare
1.	Geographical Area	467.15
2.	Net cultivated land	215.60
3.	Total cultivated land	280.50
	Area in kharif	188.40
	Area in rabi	92.10
4.	Total irrigated land	38.90
5.	Rainfed area	176.70
6.	Cropping intensity	130%

Source- Agriculture Statistical Department, Mandla

(b) Aera of Kharif Crop

S. No.	Name of crop	Area-000 ha	Production -000 tonne	Productivity(kg/ha)
1.	Paddy	111.30	161.60	1452
2.	Maize	18.20	32.00	1760
3.	Kodo/Kutki	37.00	11.50	312
4.	Jowar	0.10	0.10	1126
	Total cereal	166.60	205.30	
5.	Urd	2.10	0.50	252
6.	Moong	.10	-	325
7.	Arhar	4.10	3.90	961
8.	Other	-	-	-
	Total pulse	6.30	4.50	-
9.	Til	1.50	0.60	430
10.	Ramtil	8.30	2.10	250
11.	Grondnut	0.04	-	1000
12.	Soybean	2.40	2.10	883
	Total oilseed	12.24	4.90	-
13.	Sunhemp	2.80	-	-
	Grand total	187.94	214.60	-

Source- Agriculture Statistical Department , Mandla

(c) Aera of Rabi Crop

S. No.	Name of crop	Area (000 ha)	Production (000 tonne)	Productivity
1.	Wheat	34.40	46.60	1350
2.	Gram	5.50	3.60	650
3.	Lentil	13.90	5.60	400
4.	Pea	16.50	5.00	300
5.	Other	1.60	0.70	-
	Total pulse	37.50	14.90	-
6.	Mustard	15.20	9.10	600

Source- Agriculture Statistical Department, Mandla

Sericulture in Mandla District

Madhya Pradesh produced 752 tonns of cocoon of mulberry silk harvested in 3281 acres and 700 lakh cocoon of tasar silk during year 2009-10. Mandla district has been one of the important districts on the sericultural map of Madhya Pradesh .In Mulberry and Tasar Cocoon rearing accounted 4.29% of the total production and 8.96% of total area under mulberry cocoon and 2.85% of total tasar cocoon of the state.

Table 2.3 Mulberry and Tasar Cocoon Production in Mandla District

Year	Mulberry			Tasar		
	Area (acre)	Production (kg)	Productivity (kg/acre)	Area (acre)	Production (No. of cocoon)	Productivity (No./acre)
2000-01	62	7220	116	303	211180	697
2001-02	62	8000	129	303	235118	776
2002-03	67	5273	79	303	634551	2094
2003-04	69	6123	89	303	671459	2216
2004-05	69	11017	160	303	1001153	3304
2005-06	69	11232	163	303	1008552	3329
2006-07	82	15200	185	303	1020206	3367
2007-08	82	16752	204	303	1917529	6328
2008-09	69	19046	276	303	1996866	6590
2009-10	62	19409	313	303	2618991	8644

Source- Sericulture Department, Mandla

Fig. 1: Map of Mandla

CHPTERE-III

REVIEW OF LITERATURE

Review of literature is very essential for any research. The main objective of review of literature is to determine what works (both theoretical and practical) have been done in the past, which could assist in delineation of problematic area, provide a basis for conceptual frame work, method and procedures and suggest operational definitions of major concept to help in interpretation of findings. Hence it can be concluded that the review of literature provide guide line to an investigator making his work more precise through the use of review of literature. Some of review of literature related to the present study is reviewed in the following headings -

3.1 Trends in cocoon production

3.2 Costs and returns of mulberry and tasar cocoon production.

3.3 Yield gaps in cocoon production

3.4 Constraints in cocoon production

3.1 Trends in cocoon production

Raveendra *et al.,* (1997) conducted a study on seasonal, spatial and temporal performance of sericulture in Hassan district, Karnataka. They reported that the average annual compound growth rate of productivity for bivoltine cocoons was 5.3%. Cocoon productivity for cross breed showed an insignificant growth rate. The total cocoon production trend registered an annual compound growth rate of 36.98 per cent.

Rai (2000), found that Jharkhand remained the leading state of India in tasar raw silk production since independence due to availability of luxuriant forest having adequate food plants, long tradition of tasar culture with tribal families, presence of several

clusters of hand looms producing tasar yam & fabric and involvement of middlemen at different stages of production & marketing. On 15thNov' 2000 Jharkhand was carved out of Bihar and more than 90% of tasar cocoon producing area came under Jharkhand and more than 90% of looms went to Bihar.

Reddy *et al.,* (2005), studied that tropical tasar cocoon is spun by a sericigenous insect, *Antheraea mylitta,* which feeds on many forest trees.India has a vast tasar food flora, but only 5% are presently put to use for tasar rearing. Recently attempts were made to extend tasar culture to central and southern states. South Indian states like Karnataka and Kerala also have many species of food plants, but tasar culture as a tribal activity does not exist in these states. They conducted survey and found the existence of tasar silkworms on many species of food plants was ascertained. Successful rearing of a new race of tasar from Kerala was conducted with a view to promote tasar culture as a Joint Forest Management activity.

Katambale (2007), was studied was in bivoltine seed cocoon area of Belgaum and Uttar Kannada district. The specific objectives of the study were the development of grade A large number of variables were found insignificant in determining the price of seed cocoon by visual inspection. This makes clear that there is a need to evaluate quality characters of seed cocoon to determine the price paid to the producers in accordance with quality. The net returns from the seed cocoon were amounted to Rs. 89,219 and 45,036 per acre of mulberry garden respectively. among the cost components operation cost formed the major item of cost. The price of seed cocoon in both Belgaum and Sirsi market shows increasing trend. The major problems expressed by the farmers in production were incident of pest and disease, non availability of dfl's in time, high wages to workers and in marketing of seed cocoon fluctuation in prices, unremunerative prices, absence of quality based pricing which can be over come

by strengthening extension system, providing adequate credit facility and introducing scientific grading.

Rahmathullav *et al.,* (2007), studied that Influence of oral administration of folic acid to 5th instar silkworm larvae of a popular Indian bivoltine hybrid (CSR2 x CSR4) was studied. Folic acid solution spraying on mulberry leaf and feeding to silkworm significantly improved larval weight, silk gland weight and growth rate. Higher larval and silk gland weight subsequently improved the economic parameters like cocoon weight, shell weight and shell ratio of folic acid treated batche.

Naik (2008), studied on growth, development and economic cocoon parameters of eri silkworm *Samia cynthia ricini* Boisduval on new hosts were carried out at DBT Ericulture laboratory. She find that among 23 plant species tried for ericulture, five plant species have been accepted by the eri silkworm. Out of five plant species, eri larvae had good feeding response and survivability on fountain tree, banyan tree and Indian almond, moderate response on carrot leaves and slight feeding response and survivability on jack fruit leaves. The new host plants significantly influenced the weight of chawki and grownup worms. The maximum larval weight was recorded during November-December (4.35g). Carrot leaf is the best alternate new host for chawki worms and fountain tree leaves for grownup eri worms.

Joshi (2009) observed that the year to year fluctuations in crop production is quite common in Indian Agriculture. These fluctuations adversely affect the production, employment and income, thereby hampering the economic growth of the country. The oilseed productions in Karnataka have recorded increase during certain years and also decrease during some other years. The growth achieved is different in different time period and regions. There are totally nine oilseed crops grown in India and Karnataka viz. Groundnut, Castor, Sesame, Linseed, Soybean, Niger seed, Rapeseed and Mustard, Sunflower and Safflower. He

studied the growth in area, production and productivity of oilseed crop and also to identify the instability in selected oilseed production.

Onyenweaku *et al., (*2010) examined the growth in food crop productivity in Imo State in Nigeria with emphasis on the decomposition of total factor productivity (TFP) into technical progress, changes in technical and allocative efficiency and scale effects. Technical change was the main constraint to the achievement of high levels of TFP. The allocative efficiency had an average magnitude closer to the scale effect and points towards decreases in the efficiency with which production factors are allocated. This is an indication of a decline in technical efficiency

Ayandiji*, et al.,* (2011) analysied that there was an increase in the pressure to improve the quantity food produced relation to rapid increase population. This examined the trends of the output five food crops grown Nigeria between year 1990 and 2005, the production and recommends policies for sustainable increase food in Nigeria. Secondary data were obtained and regression analysis was used for data analysis. The result showed that the physical output food crops in Nigeria portrayed a clear trend over the period reviewed. Out of all the crops studied cassava constituted 62.27% in the total output the crops within the period under review, followed by maize (14.3%), and then millet (11.96%); rice was 6.54%. the lowest contribution 4.92% came from beans. The neglect the agricultural sector has negative effect on the food crops and therefore needs effective policies to boost nit. These policies will turn ensure the much expected positive.

3.3 Costs and returns of mulberry and tasar cocoon production.

According to Kumarean *et al.,* (2005), the cash inputs such as chemical fertilizers and disinfectant chemicals are used less than the recommended quantities,whereas labour is used in excess. The production function analysis has indicated that bullock power, human labour, quantum of feed and disinfectants are the important inputs which significantly influence cocoon production. It has been suggested that intensified extension efforts would bear fruitful results in popularizing the improved rainfed sericulture practices

Reddy et al., (2005), showed that the silkworm rearing and grainage performance being important for sustenance of tropical tasarculture, the cocoons generated on *Lagerstroemia parviflora* food plant were analyzed for economic viability in comparison with *Terminalia tomentosa* plant. Though, the overall performance of tasar rearings and grainage behaviour was found better in *T. tomentosa* food plant, the important commercial traits like cocoon weight, shell weight, silk ratio and egg fertility are positive in *L. parviflora* fed cocoons. This indicates the better availability of nutrients required forsilk production and egg fertility in *L. parviflora* food plant than *T. tomentosa* and hence, the leaf of *L. parviflora* can be fed during final larval stages to attain optimal silk and seed productivity in *A. mylitta*.

Lakshmanan and Mallikarjuna (2006) reported that the cost of cocoon production per kg of cocoon increased from Rs 70.43 during 1993-94 to Rs 79.29 in 1995-96, which is due to the escalation of input prices in their study on an economic analysis of sericultural farming business in Tamil Nadu - an empirical study. The average cocoon price increased from Rs 81.12 to Rs 105.53. They also suggested introducing minimum support price for commercial cocoon producers to increase both profitability and productivity in the region.

Lakshmanan and Geetha (2007) demonstrated in their study on employment opportunities in sericulture in Tamil Nadu that female labour participation is higher in particular and employment opportunities are even wider in sericulture in general as compared to other crops. They showed that mulberry sericulture generated 532 man days (of this, 319.20 man days utilised were from own family source and 212.80 man days hired) from one year period, in its activities such as garden establishment, leaf production, silkworm rearing and marketing while it was 296.15 man days for sugarcane and 133.50 man days form turmeric. They also observed that the sex ratio in labour participation was the highest in sericulture i.e. 1:1.86 while it was 1:0.93 for sugarcane and 1:1.49 for turmeric.

Ramalakshmi (2007) stated that. eri culture that play an important role in generating additional income to tribal and small farmers belonging to disadvantageous sections of the society through optimum utilization of the eri food plantations, castor (*Ricinus communis*) and tapioca (*Manihot utilissima*) cultivated by them.Eri culture is also play a important role in poverty elevation and empowerment of women in rural areas of Andhra Pradesh.

Rani (2007) present the details of employment generation through sericulture activity in drought prone area where 90%of the district population subsists on agriculture .It focuses mainly on the employment of women in the activity which can be easily performed by them. It also emphasizes on the income generation through the activity. It also presents a comparison of generation of employment by other crops

Hajare *et al.,* (2008) observed that the contribution from sericulture enterprise was found to be highest at 52 per cent (Rs.82315/ha/yr) followed by paddy-sunflower (20 per cent), soybean-wheat (15 per cent), and soybean-gram (12 per cent) in paddy area, whereas it was as high as 54 per cent followed by cotton-pigeon pea (17 per cent), soybean-wheat (16 per cent) and

soybean-gram (13 per cent) in cotton area and sustained income continued up to 15-20 years.

Purushotham *et al.,* (2009) found that sericulture provides a continuous income throughout the year. Cost and return structure from cross-breed (Pure Mysore x CSR2) silkworm rearing was estimated Detailed study of the economics revealed that the major economic factor contributing for the total cost in structure was labour which was 32.54% for silkworm rearing and 13.95% for mulberry production. Another important item was cost of equipment for silkworm rearing which is about 11.27%.

Umesh (2009) studied the overall growth in production of cocoon and raw silk in India exhibited a decreasing trend with moderate instability. The overall performance of non-mulberry silk was encouraging as the growth rates were positive particularly in case of Eri and Muga. The co-integration tests showed lack of integration implying that, there was no long run equilibrium relationship between domestic and world market prices. The analysis of trade competitiveness measures showed country does not possess competitiveness in the production of raw silk.

Kumar Utpal and Manjit Das (2010) found that age-old agro-based sericulture activities have been playing an important role in the generation of employment and income in a slowly progressing economy of Assam. There has been a significant change in the relative position of each sericulture activity in terms of generation of employment and income and popularity among the people. It was observed that ericulture over the years has become more popular among the people, as it is still cheap and it yields more revenue to the family farms than the other sericulture activities. Though muga is very popular to a certain section of population and yield more net profit per unit of investment, its undertaking requires more capital and also it involves more risk compared to the other ventures

Singh *et al.,* (2010) suggested a working model of commercial chawki rearing center, which is scientifically designed and economically viable. It has been observed that running a commercial chawki rearing center to its fullest capacity is more profitable than production of cocoon for reeling

Dewangan *et al.,* (2011) found that sericulture provides additional income to tribal women and socioeconomic upliftment is done through sericulture. Due to local employment generation state migration is checked. After adopting the sericulture, they need not go to money lenders or any middle man thus resulted their self-respect elevated and they recognized socially. They also released from the debt ness.

4.4 Yield gaps in cocoon production

Dodamani *et al.,* (1997) identified the constraints in mulberry cultivation and silk cocoon production in their study on problems of sericulture enterprises in Gulbarga district, Karnataka. They indicated that the incidence of pest and disease as well as shortage of irrigation water were the major problems in mulberry cultivation. Non availability of separate rearing rooms, shortage of rearing equipment, mortality of layings and lack of availability of disease-free layings were the other problems faced by farmers in silk cocoon production

Gaddi *et al.,* (2002) reported that a total yield gap of 1526.30 kg/ha, comprised a relatively higher Yield Gap-I (893.50 kg/ha) than Yield Gap-II (632.80 kg/ha) in their study on yield gaps, constraints and potential in cotton production in North Karnataka - an econometric analysis. The index of yield gap, index of potential yield and index of potential farm yield were 56.55%, 43.45% and 65%, respectively. Decomposition analysis revealed that among the different sources contributing to Yield Gap-II (42.45%), differences in the cultural practices between the farmers' field and the demonstration plots explained 28%, while

the suboptimal input was 15%. Shortfall in the use of human labour and bullock labour are the greater portion of this gap. Non-availability of labour and incidence of pest and diseases, non-application of chemical fertilizers at the recommended level and non-availability of recommended variety and genuine seeds among the large farmers were the major constraints in cotton production

Venkataramana *et al.,* (2003) in their study on potentials of improved mulberry leaf and silkworm cocoon production technologies in Telangana Region (A. P.) - an assessment through field demonstrations, showed that leaf yield was 30,371 kg/ha per year during 1998- 99 and 31,526 kg/ha per year during 1999-2000, compared to the benchmark yield of 20,772.80 kg/ha per year with the adoption of the full package of moriculture. Silkworm cocoon yield was 51 kg/100 disease-free layings (dfls) during 1998-99 and 51.75 kg/100 dfls during 1999-2000, compared to the benchmark yield of 27.27 kg/100 dfls. Results indicate that the leaf yield showed an increase of 48.13% in 1998-99 and 51.74% during 1999-2000 compared to the benchmark yield before the start of the demonstration. The use of the improved technology was found to be highly productive. Additional net returns of Rs. 2978.75 in 1998-99 and Rs. 3316.95 during 1999-2000 were observed in 0.5 acre and 100 dfls rearing. They concluded that the constraints observed through a survey were responsible for the yield gap.

Prakash and Dandin (2005) in their study on yield gaps and constraints in bivoltine cocoon production in Mandya District of Karnataka revealed that the major constraints for bringing down economically recoverable gaps were crucial inputs such as mulberry leaf, disinfectants, human labour and mountages

Reddy (2006) studied that majority (71.66%) of the respondents had medium level of management efficiency. The components of management efficiency like knowledge about

improved sericulture, skills acquired ability to mobilize resources, efficient use of resources, timely adoption, ability rational marketing and competence in evaluation in all these aspects majority of sericulturists were belonged to medium level of category.

Singh *et al., (*2006) analysed to know the major factors causing the difference between the actual and the attainable yield and yield gap of soybean crop for several locations in India. For the eleven selected sites in India, the potential yield of soybean ranged from 1249 to 3050 kg ha-1 whereas the observed yields ranged from 570 to 1120 kg ha-1 giving yield gaps ranging from 235 to 1955 kg ha-1 (19–65% of potential yield). For northeastern Thailand the yield gaps ranged from 1370 to 2320 kg ha-1 (38–65%) in paddy, 175 to 270 kg ha-1 (11–18%) in upland rice, 1210 to 3180 kg ha-1 (25–67%) in maize, 625 to 940 kg ha-1 (32–49%) in soybean, and 190 to 570 kg ha-1 (11–33%) in groundnut. In northern Vietnam the farmers were able to harvest almost two-third of the potential yield of maize; however, in groundnut and soybean the yield gap was wider and ranged from 40% to 60% of potential yield.

Singh *et al.,* (2007) studied that training to the farmer's and participatory front line demonstrations is an efficient measure for reducing knowledge gap of farmers and enhancing productivity, generating production data and collection feed back for large adoption of the technology. The study concluded that, higher yields under demonstration over farmers practices was found in case of management of insect pest , organic farming, improve variety JA-4, use of zinc sulphate, followed by other demonstration

Mattigatti *et al.,* (2009), analyses the total yield gap in sericulture (mulberry and silkworm rearing) into three different gaps *viz.* yield gap-I, yield gap-II and yield gap- III. Yield gap-III indicates the yield uncertainty in sericulture. A wider total yield

gap was observed in mulberry leaf production (47.46 per cent) compared to silkworm rearing (mainly Multivoltine) and cocoon production (14.46 per cent). In the case of mulberry yield gap-I was higher (33.40 per cent) compared to yield gap-II (9.92 per cent) and yield gap-III (12.42 per cent). Thus, yield gap in mulberry is mainly due to variation in climatic factors and water resources. Yield gap in silkworm rearing is mainly due to uncertain factors (9.24 per cent) indicating that silkworm are sensitive to environmental factors.

3.4 Constraints in cocoon production

Jadhav *et al.,* (2007), studied on the constraints faced by the farmer in mulberry cultivation and silk worm cultivation and they found that four types of constraints faced by the silk worm rearing farmer (1) non availability of rearing equipment, (2) high cost of manure fertilizer, (3) fast deterioration in quality of cocoon,(4) temperature and humidity.

Singh *et al.,* (2008) studied that the farmers in Haryana particularly small and marginal were showing interest in adopting mushroom cultivation due to its high profitability the unemployed youths, housewives and farmers are attracted towards this enterprise because the space required for mushroom cultivation is available even at home. In spite of all efforts, there were number of problems encountered by the mushroom growers in its cultivation. The major constraints in mushroom production technology were found to be the fluctuating price prevailing in the market, lack of cold storage and non-a availability of drawing equipments, lack of information about marketing, lack of finance, lack of transportation facilities, inadequate knowledge about mushroom production technology and non-availability of spawn.

Qadri *et al*., (2010) were found that the adoption level of the improved package of practices of mulberry cultivation and silkworm rearing were at very low rate. Expensive and cumbersome technologies, lack of awareness, and non-availability of technology were attributed as the major reasons for non-adoption. Creating awareness and interest among farmers

about latest technologies and development of farmer-friendly and cost-effective technologies are needed. Hence, it has been suggested that intensified extension efforts would bear fruitful results in popularizing the improved sericulture.

Shukla (2010) investigated problems faced by sericulturists were conducted during 2007-08 in district Udaipur of south Rajasthan. Seventy sericulturists (35 each adopters and non-adopters) from two Tehsils viz Mavli and Jhadol were selected purposively for the study. The results revealed that majority of the respondents (95.71%) face the problem of irrigation during summer among them 10% sericulturists face the problems during marketing of cocoons. Problems like problems of family labor (8.85%), housing for silk worm (7.14%), serious silk worm diseases (5.71%) and monetary problems (5.71%) were least expressed by *the sericulturists of the study area.*

Maske et al., (2011) defined the critical constraints in production and marketing of papaya in Raipur district of Chhattisgarh. The study was confined to papaya fruit which is second major fruit in Chhattisgarh state after banana. The growers were classified as small (upto 2 ha.), medium (2.0 to 4 ha.) and large (above 4 ha.) categories. The problem of lack of disease/insect/pest in these fruit crop is felt by about 77 percent farmers followed by lack of improved varities in the fruit crop.

Uwagboe et al (2010) examined constraints of farmers in cashew production in Orire Local Government Area of Oyo state Nigeria. There are problems of low yield and utilization of cashew pseudo apple. Majority of the respondents ranked inadequate capital (finance) as the most severe constraint while lack of storage facilities was ranked by few of the respondents. This could be attributed to difficulty in obtaining loan from the banks due to collateral while storage facilities constraint could be attributed to the fact that the cashew farmers in the did not store their produce for processing. This resulted to reduction in income of cashew farmers.

CHAPTER-IV

MATERIAL AND METHODS

This chapter deals with the analysis and interpretation of collected data from 90 mulberry and tasar cocoon grower respectively. The analytical frame work employed and the concepts are also explained to facilitate a clear understanding of the issues related to the present study. The methodology is presented under the following sub - headings:

4.1 The study area

4.2 Nature and method of data collection

4.3 Methods of analysis

4.1 The study area

Madhya Pradesh ranks 3rd in non - traditional sericulture growing states of India produced 752 tonnes of cocoon of mulberry silk harvested in 3281 acres and 700 lakh cocoon of tasar silk during the year 2009-10. Mulberry cocoon production primarily concentrated in the south eastern region i.e., Hoshangabad (421.2 acre), Balaghat (432 acre), Vidisha (474.5 acre), Rajgarh (415.8 acre) and Mandla (289 acre). Thus, Mandla districts occupied fourth position in the state with regard to area under mulberry cocoon production. In M.P. area of tasar is concentrated in Jhabua (386.8 acre), Mandla (168 acre), Balaghat (139 acre) and Sidhi (70 acre). , in the state with regard to area under tasar cocoon production Mandla districts occupied second position. Hence, this district has been selected purposively for the present study.

Table 4.1: Area under Cocoon in Potential Districts of Mulberry and Tasar in Madhya Pradesh during the Year 2009-10

S. No.	Name of district	Total Area (acre)	
		Mulberry	Tasar
1	Sehore	145.5	-
2	Raisen	35.8	20
3	Vidisha	474.5	-
4	Rajgarh	415.8	-
5	Hosangabad	426.2	61
6	Narsinghpur	254.7	50
7	Sidhi	115	70
8	Panna	140	-
9	Balaghat	432	139
10	Mandla	289.	168
11	Jhabua	-	386.8
	Madhya Pradesh	3281	

Source - Directorate of Sericulture, M.P, (2009 – 10)

4.1.1 Sampling Design

Mandla district accounted for the fourth and second largest area under both mulberry and tasar respectively. Hence, this district was selected purposively for the study. Further, for selection of block, Mandla block largest producer of mulberry and tasar cocoon i.e. was selected. In the next phase, three villages from the selected Mandla block were selected randomly, where there were atleast 50 sericulturists rearing multivoltine silkworms. The villages so selected from Mandla block for mulberry were, Tindni , Gajipur and Purva and for tasar cocoon Tindni, Gajipur and Babeha .

Table 4.2: Block wise Mulberry and tasr Cocoon Production In Mandla District, year 2009-10

S. No.	Block	Mulberry			Tasar		
		Area (acre)	Production (in kg)	Productivity (kg/acre)	Area (acre)	Production (in kg)	Productivity (kg/acre)
1.	Mandla	69	19046.00	276.03	281	1277226	4549
2.	Nainpur	100	5976.00	59.76	10	38775	3878
3.	Bichiya	12.5	592.00	47.36	143	617285	4323
4.	Niwas	-	-	-	-	-	-
5.	Narayanganj	-	-	-	-	-	-
6.	Bijadandi	-	-	-	-	-	-
7.	Ghughari	25	2372.30	94.89	-	-	-
8.	Mavai	50	2685.00	53.70	-	-	-
9.	Mohgaun	37.5	1563.00	41.68	10	62980	6298
	Mandla District	294	32234	573.42	444	1996266	19048

Source: Department of Sericulture, Mandla

Table 4.3 Distribution of Respondent in the Selected Village

S. No.	Selected Village	Mulberry			Tasar		
		Total No.	No of Seri culturist Selected	Percentage of Seri - culturist Selected	Total No	No of Seri - culturist Selected	Percentage of Seri - culturist Selected
1.	Tindni	75	15	20	90	15	17
2.	Gajipur	68	15	22	100	15	15
3.	Purva	62	15	24			
4.	Babeha				75	15	20

From each selected village, a list of farmers growing mulberry and tasar cocoon were prepared. From the list, 15 sericulturists were selected at random from each village. Thus, the total sample size was 90 sericulturists, from whom the data were elicited.

4.2 Nature and method of data collection

4.2.1 Nature and Source of data

Both secondary and primary data were collected to fulfil the stated objectives of the present study.

4.2.1.1. Secondary data

Area, production, yield of mulberry and tasar grown in Mandla district were collected from District Agricultural Statistics (Mandla district) covering one decade period ending year 2009-10.

4.2.1.2. Primary data

Data pertaining to sericulturists' socio-economic characteristics, land holdings, cropping pattern, input use, total output and prices, input availability and opinions of the sericulturists on yields were collected.Costs and return from mulberry, yields of the mulberry on farmer's fields, experimental station, and potential farm yield and constraints etc. were collected by survey method and personal interview of the respondents using pre-tested question schedule pertain to the year 2011-12. Every effort was made at the time of the interviews to convince the respondents that the study was undertaken purely for research purpose and the information provided would not be used for any other purpose. The data pertaining to the potential farm and the experiment station yield were collected from the Regional Sericultural Research Station, Tindni, Mandla, which had conducted several trials on the farmers fields and the Regional Sericultural Research Station farm respectively.

4.3 Methods of analysis

The analytical procedure depends on the specific objectives in view. The methods used for the analysis of primary and secondary data are as follows.

4.3.1. Primary data analysis

Primary data were subjected to analyze by using average, percentage, different cost and profatibility concepts and yield gap techniques viz.,

4.3.1.1. Cost and returns

Costs and returns covering fixed cost and operational cost and physical yield in multivoltine cocoon production were estimated by using the following costs.

A) Operational costs

a) Cost of DFL - The cost of DFL was calculated at the actual price paid by each farmer plus the incidental costs incurred on DFL procurement.

b) Chawki rearing cost – The cost involved in rearing the early or first stage silkworms after hatching from the eggs to 2-3 instar larvae).

c) Cost of mulberry leaf – The actual quantity of mulberry leaf consumed for the silkworm crop was multiplied by the imputed cost (per kg) of leaf for each sericulturist. The purchased leaves, if any, were accounted at the actual cost.

d) Cost of human labour – Human labour was valued at the prevailing wage rate paid by each farmer on per man-day basis. The cost of family labour was imputed at the wage rate paid to the hired casual labour. The man-day equivalents of women and child labour were worked out by using the wage ratios.

e) Hire charges on mountages – The actual cost paid out to hire mountages was used. In case of owned mountages the cost was imputed at the hire charge rates prevailing in the area.

f) Cost of disinfectants – It was the cost of all the chemicals used to disinfect the rearing house. The actual purchase price of all the chemicals was considered as the total cost of disinfectants.

g) Cost of paraffin paper/ news paper – It was the actual purchase price of the news paper. The price of news paper was Rs.5/ Kg.

h) Interest on working capital – This was computed at the rate of 10 per cent per annum on the cost of DFLs, mulberry leaf, human labour, hire charges of mountages, disinfectants and disinfestations cost, news paper cost, cocoon picking (harvesting) cost, marketing cost for a period of one month which is the average period required to raise one cocoon crop.

B) Fixed cost

a) Apportioned cost of rearing house and depreciation charges of rearing equipments – The apportioned cost of rearing house for a lifespan depending on the type of construction was included under this cost. The rearing equipments comprise rearing stands, mountages, naylon net, sprayer and leaf cutting knives. The depreciation charges were worked out by the fixed instalment method.

$$\text{Annual depreciation} = \frac{\text{cost of cultivation}}{\text{Life span of asset}}$$

The life span refers to average expected life of the asset as furnished by the farmers.

b) Interest on fixed capital – The annual charge on fixed assets and equipment was charged at 10 per cent per annum. This was then apportioned based on the number of cocoon crops raised per year.

C) Returns from silkworm rearing

a) Cocoons – The main product of the silkworm rearing is the good and standard cocoons and these were valued at the actual prices realised by sericulturists at each sale of the produced cocoons.

b) Litter – The faecal pellets of silkworm and the leaves left over were used as Farm Yard Manure (FYM) and were valued at the prevailing price of FYM. Actual price of FYM per quintal was considered as the price of the litter per quintal.

D) Profitability concept

(a) Gross income – The gross income realised from silk cocoon production consisted of value of total cocoons produced and the value of the litter and expressed

Gross income = Monetary value of total cocoon production

(b) Net income – The net income from silk cocoon production was estimated by deducting the total cost of cocoon production from the gross income

Net income = Gross income – Total cost of cocoon production

(c) Benefit –Cost ratio - comparison the present worth of cost with present worth of benefit.

$$\text{B-C ratio} = \frac{\text{Present worth of gross return}}{\text{Present worth of total cost}}$$

(d) Break-even production $= \dfrac{\text{Total cost – value of litters}}{\text{Price per unit}}$

(e) Break – even cost $= \dfrac{\text{Total cost – value of litters}}{\text{Physical yield}}$

(E) Yield gaps

Some of the concepts which have been used in the study are defined and operationalised below.

(a) Yield gap refers to the difference between the potential yield and actual farm yield.

(b) Potential yield refers to that which is obtained in the experiment station. The yield is considered to be the absolute maximum production of the crop possible in the given environment, which is attained by the best available methods and with the maximum inputs in trials on the experiment station in a given season.

(c) Potential farm yield is the yield obtained on the demonstration plots on the farmers' fields in the study area. The conditions on demonstration plots closely approximate the conditions on the cultivators' fields with respect to infrastructural facilities and environmental conditions.

(d) Actual yield refers to the yield realised by the farmers on their farms under their management practices.

(e) Yield Gap-I – It is related to the difference between experiment station and potential farm yield. Yield Gap-I is hypothesised to be caused by either the environmental differences between experiment station and farmers' fields or by non-transferable technology.

(f) Yield Gap-II – It is related to the difference between potential farm yield and the actual farm yield. It is hypothesised to be caused by biological and socio-economic constraints; biological constraints stem from the non-application of essential production inputs and the socio – economic constraints from the social or economic conditions that prevent farmers from using the recommended technology

(g) Index of yield gap refers to the percentage of yield potential unrealised i.e.,

$$\text{Index of yield gap} = \frac{(\text{Potential yield} - \text{Actual yield})}{\text{Potential yield}} \times 100$$

(h) Index of realised potential yield is defined as the percentage of the yield potential achieved. Thus,

$$\text{Index of realised potential yield} = \frac{\text{Actual yield realised}}{\text{Potential yield}} \times 100$$

Therefore,

Index of potential realisation = (100 – index of yield gap)

In other words, the index of potential realisation plus the index of yield gap equal to 100 (full potential yield index)

(i) Index of realised potential farm yield is defined as the ratio of actual yield to potential farm yield, expressed in percentage. Thus,

$$\text{Index of realised potential farm yield} = \frac{\text{Actual yield realised}}{\text{Potential yield}} \times 100$$

(j) Improved practice is defined for this study as the level of each factor anticipated giving the potential yield and is fixed for all the farms in the region.

(k) Farmers' practice is what the farmers had done in the crop season under study.

For the computation of yield gap, simple tabular analysis was used.

(F) Constraints

For identification of constraints hindering cocoon production respondents opinion were sorted out.

4.3.1 Secondary data analysis

4.3.2.1. Change

(a) Absolute change = Current year- Base year

(b) Relative change (%) = $\frac{\text{Current year-Base year}}{\text{Base year}}$ x100

Base year = Triennium average of area production and yield of mulberry and tasar ending 2002- 03

Current year = Triennium average aera production and yield of mulberry and tasar ending 2009-10

4.3.2.2. Trend

It shows the direction of change in the mulberry and tasar cocoon in the area. For calculation of trend of mulberry and tasar cocoon production in Mandla district from the period 2000-01 to 2009-10, least square technique were employed.

Y = a + bx

Y= area, production and yield of mulberry and tasar
x= Period (year 2000-01to 2009-10)
a= intercept
b= regression coefficient

4.3.2.3. Growth rate

(a) Simple growth rate – simple growth rate is the rate of change over the period in percentage and expressed

Simple growth rate (%)= $\frac{b}{\bar{Y}} x100$

Where

$$\bar{Y} = \frac{\sum Y}{n}$$

(b) Compound growth rate - When we are interested to know the per annum growth rate, then we estimate compound growth rate.

Compound growth rate (%) = (Antilog of B-1) x 100

where

B= log of b

(G) Physical input-output in silk cocoon production

Table 4.4 Physical Input-Output in Silk Cocoon Production

S No	Input		Output
1.	Human labour		Wage rate Rs 80 per day
2.	DFLs		At the rate of 1.5 per DFLs
3.	Mulberry levees		At the rate of Rs 1.5 per kg
4.	Paraffin/news paper		At the rate of Rs 5 per kg
5.	Mountages		Rs 5 for each Mountages
6.	Fertilizer	(a) Urea	At the rate of Rs 6 per kg
		(b) SSP	At the rate of Rs 3.4 per kg
		(c) MOP	At the rate of Rs 4 per kg
7.	Disinfectants		At the rate of Rs 2443 per litter.

CHAPTER -V

RESULTS AND DISCUSSESION

In previous chapters, the subject of this research study has been described with respect to practical utility and significance of the study, review, methodology and background of the study. Area which set the ground for describing the various result results obtained from analysis of the data within the limits of the objectives of the study. In this chapter, an attempt has been made to analyse the collected data in the light of objectives in an established sequence.

The necessary data were collected from the respondents spread over the selected villages of Mandla block in Mandla district of Madhya Pradesh. Data were subjected to various statistical tools and techniques to drawn meaningful conclusions. The result of study are presented in the following subheads -

5.1 Growth rate in cocoon production

5.2 Soceio-economic profile of the sample respondents

5.3 Costs and returns of mulberry and tasar cocoon production.

5.4 Yield gaps in cocoon production

5.5 Employment Generation in Mandla Block

5.6 Constraints in cocoon production

5.1 Growth rate in Cocoon Production

5.1.1 Index Number of Area Production and Productivity of Mulberry and Tasar Cocoon in Mandla District

In this part indices of area, production and productivity of mulberry and tasar cocoon have been worked out to exhibit the year to year fluctuations occur and their trend which they followed.

Table 5.1 Indices of Area Production and Productivity of Mulberry and Tasar Cocoon in Mandla District during the year 2000-01 to 2009-10.

Year	Mulberry			Tasar		
	Area	Production	Productivity	Area	Production	Productivity
2000-01	100	100	100	100	100	100
2001-02	100	111	111	100	111	111
2002-03	108	66	61	100	270	270
2003-04	103	116	113	100	106	106
2004-05	100	180	180	100	149	149
2005-06	100	102	102	100	101	101
2006-07	119	135	113	100	101	101
2007-08	100	110	110	100	188	188
2008-09	84	114	135	100	104	104
2009-10	90	102	113	100	131	131

Table 5.1 exhibited that higher production and yield indices were observed in tasar cultivation. Highest mulberry area indices (119%) were recorded in the year 2006 -07 followed by year 2002 – 03 (108%). Out of 10 year considered for study area index was below than the base year in two year. Movement of production and yield index moved with almost an equal stepping through out the study period production and yield index recorded its maximum (180%) in the year 2004 – 05. Fluctuation in the area was less as compared to production and yield. Thus, increased production appeared to due to productivity.

Indices calculated for production and yield of tasar in Mandla district showed irregular movement as presented in table 5.1. Area indices of tasar showed a constant degree of change indicating no trend in area indices. Production and yield index reached highest point (270%) during the year 2002-03 followed by

188 percent in the year 2007 – 08. Lowest performance was observed in the year 2005 – 06 and 2006 – 07. Thus, no systematic and remarkable trend was observed in the production and yield, although yield was the only factor to increase tasar production.

5.1.2 Change in sericulture production in Mandla District During the Year 2000-01 to 2009-10.

A discussion on absolute and relative changes in area, total production and yield of the mulberry and tasar cocoon in Mandla district have been carried out in the following section. The mean for the tasar (2001 to 2003) and last triennium (2007 to 2010) have been used for measuring the absolute and relative changes in mulberry and tasar cocoon production.

Table 5.2 Absolute and Relative Change in Area, Production and Productivity

S. No.	Particulars		Base year	Current year	Absolute change (No)	Relative change (%)
1.	Mulberry	(a) Area	63.67	71	7.33	11
		(b)Production	6831	18402	11571	169
		(c)Productivity	108	264	139	112
2.	Tasar	(a) Area	303	303	0	0
		(b)Production	360283	2177795.33	1817512.33	504
		(c)Productivity	1189.053	7187.443	5998.39	504

As regard absolute change in area of mulberry in Mandla district, it is observed that these were a tendency towards increase in mulberry area from 63.70 areas to 71 area between two periods (table 5.2). Thus, there was a net increase of 7.30 acre and relative change came to 11.50 percent. Similarity the total mulberry production increased considerably by 11571 kg which was an increase of 169 percent between the two periods.

The increase in production was notably to the increase yield (144 %) as compared to area increase (11.50 %).

In Mandla district tasar area during the period under reference recorded to be constant (302 acre). The average yield of tasar was 7187 cocoon number in the current period which was 504 per cent more than the base period yield. Total production of tasar increased by 1817512 numbers giving an increase of 504 percent. The important point to note is that tasar area remains constant while the increase in production was of the order of 504 percent. Thus it can say that the production of tasar increased remarkably, perhaps by the increase in productivity.

5.1.3.Trend analysis

In the previous section, a detailed discussion on the shift in area, total production and yield of mulberry and tasar in Mandla district of Madhya Pradesh have been synthesized using simple statistical techniques like absolute and relative change. In this section a little precise statistical tool in linear has been used to find out the growth trend. Trend equation (y = a + bx) assumed straight line tendencies of mulberry and tasr for aera production and yield.

Table 5.3 Trend of Area, Production and Productivity Mulberry and Tasar cocoon in Mandla District (2000-01 to 2009-10)

S. No.	Particular	Mulberry			Tasar		
		Intercept (a)	Regression coefficient (b)	Mean $\overline{Y}$	Intercept (a)	Regression coefficient (b)	Mean $\overline{Y}$
1.	Area	63.87	0.987	69.3	0	0	303
2.	Production	2865.07	1647.66	11927.2	-250804	251339.78	1131560.5
3.	Productivity	47.621	22.54	171.47	-827.504	829.504	3734.523

Table 5.3 indicate that mulberry area had shown significant positive trend in Mandla district while tasar trend value was zero. The increasing trend of area under mulberry may be attributed to its remunerative price which has attracted the sericulturist to allocate more area under mulberry production and productivity of both mulberry and tasar had increased significantly because of favourable climate condition in the study area.

5.1.4 Growth rate in Cocoon Production

Table 5.4: Growth rate of Mulberry and Tasarin Cocoon Production in Mandla District during in the year 2000-01 to 2009-10

(Unit– percent)

S. No.	Particular	Mulberry			Tasar		
		Area	Production	Productivity	Area	Production	Productivity
1.	Simple growth rate	1.42	13.81*	13.15*	0	22.212	22.212
2.	Compound growth rate	1.35	15.54*	13.71	0	52.58	52.58

Note - * shows significant at 0.05 level

The simple growth rate and annual compound growth rates of area, production and productivity under mulberry and tasar in the Mandla districts of Madhya Pradesh state were worked out and are presented in Table 5.4. It could be seen that the simple growth rate of area under mulberry in the district was 1.42 percent against 1.35 per cent compound growth rate is 1.35 per cent which means the area under the mulberry is increasing at the rate of 1.35 per cent every year. As regard the rate of change in productivity year simple growth rate of mulberry yield increased at the rate of 13.15 percent and an annual compound growth of the period 13.71 per cent. Consequently production increased over the period by 13.81 per cent against 15.54 per cent per

annum which was statistically significant thus important conclusion drawn from the finding is that grown in per unit cropped are productivity which is barometer of development had more impact as compared to grown in area. Under the productivity of mulberry annual compound growth rate is 13.71 percent and growth over the ten year is 13.15 percent.

As regard the growth rate of the tasar, it is apparent from the table that tasar registered an annual growth rate of production and productivity was 52.58 percent and that of simple growth rate was 22.21 percent because area growth rate observed to be zero due to stagnant during the period under reference. Thus productivity was dominant factor for increased production.

5.2 Soceio-Economic Characteristics of the Sample Respondents

As stated in the previous chapter, the study was conducted in Tindni , Gajipur , Madhupuri villages for mulberry cocoon and Tindni , Gajipur , Babeha for tasar cocoon in Mandla Districts of Madhya Pradesh.

Table 5.5 shows that approx in all villages farmer have more than 6 members and their main occupation is mulberry and tasar cocoon growing.

The educational attainment of the respondents is presented in the Table 5.5. Table indicates that a large number of the respondents were illiterates (46.66 per cent in mulberry cocoon production and 48.88 per cent in tasar cocoon production). Out of the 45 sample respondents who grow mulberry, 21 were illiterate and remaining 24 were literate and out of 45 sample respondent of tasar grower proportion of illiterate and literate were observed to be at. Thus, over all more than 50 per cent of respondents were illiterates indicating poor education facilities in the study area.

Table 5.5 Socieo - economic features of Sample Respondents

particulars		Mulberry			Over all	Tasar			Over all
		Tindni	Gajipur	Purva		Tindni	Gajipur	Babeha	
No. of respondent		15	15	15	15	15	15	15	15
Family size		6.13	6.53	6.07	6.24	5.8	6.53	6.33	6.22
Main occupation		S	S	S	S	S	S	S	S
Education level	Illiterate	8	9	7	24	10	6	7	23
	Literate	7	6	8	21	5	9	8	22
Age (year)	20-25	0	0	1	1	0	0	0	0
	25-30	2	0	3	5	0	1	2	3
	30-35	6	6	4	16	5	7	6	18
	35-40	6	7	7	20	7	4	4	15
	40-45	1	2	0	3	3	3	3	9

Table 5.5 also indicated that the majority of the respondents of mulberry lie in the age groups of 35-40 year (44%) and 30-35 years (36%). More than one – tenth of the respondents were in the age group between 25 and 30 year. It is also observed that the majority of respondents of tasar lie in the age groups of 30-35 years (40%) and 35-40 years (33%). One fifth of the total respondents are in the age group between 40 and 45 were 20.00 per cent, in both the tasar and mulberry grower, over all more than three – fourth (77%) of the respondents were lie between 30 and 40 years of age.

5.3 Costs and returns

5.3.1 Cost of mulberry cocoon production

The costs of rearing 100 DFL have been worked out and are presented in Table 5.7.Tthere is two types of cost incurred in mulberry cocoon production i.e. variable cost or operational cost and fixed cost.

Variable cost comprises of 100 DFLs, cost of human labour, cost of disinfectants, newspaper, fertilizer, hire chares on mountages and interest on working capital at the rate of 10% per annum. Variable cost comprises of 100 DFLs, cost of human labour, cost of disinfectants, newspaper, fertilizer, hire chares on mountages and interest on working capital at the rate of 10% per annum.

It is observed from the table 5.6 that, the human labour cost was highest amounting to be Rs 1389, 1232 and 836. followed by fertilizer cost Rs 383 , 398 and 398 in Tindni, Gajipur and Purva villages respectively and at over all consumption in human labour was Rs 1152 and in fertilizer Rs 336. The cost of hire charges for

Table 5.6 Cost and returns from the mulberry production on sample farmers

(**Cost 0f 100 DFLs)**

S. No.	Economic parameter	Villages			Over all
		Tindni	Gajipur	Purva	
A	**Variable costs**				
1.	Cost of DFLs	150 (4.03)	150 (4.43)	150 (5.70)	150 (4.62)
2.	Chawki rearing cost	85 (2.28)	114 (3.36)	81 (3.08)	93 (2.86)
3.	Human labour	1389 (37.32)	1232 (36.35)	836 (31.79)	1152 (35.48)
4.	Disinfectants	53 (1.42)	65 (1.92)	44 (1.67)	54 (1.66)
5.	Paraffin/news paper	11 (0.29)	13 (0.38)	6 (0.23)	10 (0.31)
5.	Hire charges on Mountages	28 (0.75)	29 (0.86)	30 (1.14)	29 (0.89)
6.	Fertilizer	383 (10.29)	326 (9.62)	298 (11.33)	336 (10.35)
7.	Marketing costs	17 (0.46)	20 (0.59)	13 (0.49)	17 (0.52)
8.	Interest on working Capital	211 (5.67)	195 (5.75)	146 (5.55)	184 (5.67)
	Sub-total	2326 (62.49)	2143 (63.23)	1604 (60.99)	2024 (62.33)
B	**Fixed cost**				
1.	Depreciation of rearing room and equipments	1269 (34.09)	1133 (33.43)	933 (35.48)	1111 (34.22)
2.	Interest on fixed capital	127 (3.41)	113 (3.33)	93 (3.54)	111 (3.42)
	Sub-total	1395 (37.48)	1246 (36.77)	1026 (39.01)	1223 (37.65)
C	**Total Cost (A+B)**	3722 (100)	3389 (100)	2630 (100)	3247 (100)
D	**Cocoon Production (kg)**	54.54	50.23	39.07	47.95
E	**Litter production (quintal)**	9.65	10.36	11.10	10.37

Figure in parenthesis shows percentage of total cost

mountages Rs 28 29 and 30 in, selected three villages respectively with Rs 29 at over all level. Cost of disinfectants (Formalin, RKO, etc.) were Rs 53 64 and 44 and at over all level was Rs 54. Cost of 100 DFL amounted for Rs. 150 at the rate of Rs 1.5 per DFL for each village. The remaining costs like chawki rearing ranging between Rs 80 to 114 in the selected villages and marketing cost estimated to be Rs 17 , 20 and 13 and over all consumption Rs.16, and cost of paraffin paper / news paper were Rs 11, 13 and 6 at over all level was Rs.30 . Thus, the total variable costs for rearing 100 DFL were Rs.2327, 2144 and 1604 in Tindni ,Gajipur and Purva village respectively and over all variable costs, was Rs 2025.

Fixed cost includes depreciation value of rearing house, equipment, sprayer and material i.e. Rs 1268, 1133 and 933 in selected villages and at over all level was Rs 1111. Interest on fixed capital at the rate of 10% per annum estimated to be Rs 111 on sample farm. Thus total fixed cost were Rs 1395, 1246 and 1628 in Tindni , Gajipur and Purva villages respectively and at over all level was Rs 1222. Hence, total cost incurred in mulberry cocoon production were Rs 3722, 3390 and 2630 and at over all level was Rs 3247.

Table 5.7 Returns from Mulberry cocoon production

S. No.	Particular	Village			Over all
		Tindni	Gajipur	Purva	
1.	Total cost	3722	*3390*	2630	3247
2.	Gross income	5889	5490	4407	5262
3.	Net income over (a)operational cost	3562	3346	2803	3237
	(b) total cost	2167	2100	1777	2015
4.	Benefit cost ratio	1.58	1.61	1.67	1.61
5.	Cost of production (Rs)	68.24 per kg	67.49 per kg	67.32 per kg	67.68 per kg

The returns from rearing 100 DFL of mulberry have been worked out and are presented in Table 5.7. The results in the Table indicated that the returns realised from the sale of cocoons (54.54 , 50.23 and 39.07Kg) and litters (9.35, 10,36 and 11.10 quintal) produced from 100 DFL were Rs 5889 , 5490 and 4407 in Tindni , Gajipur and Purva villages , respectively and at overall level was Rs 5262. The net returns obtained over total cost were Rs 2167, 2100 and 1777, in Tindni, Gajipur and Purva villages, respectively and at overall level, Rs 2015 and over operational cost were Rs 3562, 3346 and 2803 and at overall level Rs 3237. The Benefit: Cost ratio worked out to be 1.61 at overall level from with little variation in the selected villages. Cost of production for production of one kg of mulberry cocoon estimated to be Rs 68.24, 67.49 and 67.32 per kg Tindni , Gajipur and Purva villages respectively and at over all level was Rs 67.68.

5.3.3 Cost of tasar cocoon production

Cost of tasar cocoon production also consists of operational or variable cost and fixed cost. Variable cost include cost of DFLs, material cost for chowki rearing , material cost for maintaining plantation, labour cost , marketing cost and interest on working capital.

Table 5.8 indicates that major cost incurred in tasar cocoon production was in the human labour i.e. Rs 2557, 2613 and 2575 in Tindni, Gajipur and Babeha villages of Mandla block respectively and at over all level it was Rs 2582. Second rank in consumption was held material cost for maintaining plantation amounting to be Rs 2108 which ranged between Rs 1978 to Rs 2184 in the selected villages respectively. Material cost for maintaining plantation was followed by material cost for chowki rearing (Rs 357 to Rs 424) and its average was Rs 380. Cost of DFL in selected villages was Rs 150 at the rate of Rs 1.5 per DFL. Marketing cost incurred to be Rs 46, 44 and 44 with Rs 45 at over all level. Thus total operational cost in Tindni , Gajipur and Babeha villages were Rs 5883 , 5618 and 5870 respectively and at over all level was Rs 5790.

Table 5.8 Cost and returns from the tasar cocoon production on sample farmers

(Cost 0f 100 DFLs)

S No	Economic parameter	Tasar			Over all
		Tindni	Gajipur	Babeha	
A	**Variable Cost**				
1.	Cost of DFLs	150 (2.49)	150 (2.60)	150 (2.49)	150 (2.53)
2.	Material cost for (i) chowki rearing	424 (7.04)	357 (6.19)	360 (5.97)	380 (6.40)
	(ii) maintaining plantation	2163 (35.92)	2184 (37.90)	1978 (32.78)	2108 (35.49)
3.	Labour cost	2557 (42.46)	2613 (45.34)	2575 (42.67)	2582 (43.47)
4.	Marketing cost	46 (0.76)	44 (0.76)	44 (0.73)	45 (0.76)
5.	Interest on working capital	534 (8.87)	535 (9.28)	511 (8.47)	525 (8.84)
	Sub total	5883 (97.69)	5618 (97.48)	5870 (97.27)	5790 (97.47)
B	**Fixed cost**				
1.	Depreciation of rearing equipments	126 (2.09)	132 (2.29)	150 (2.49)	136 (2.29)
2.	Interest on fixed capital	13 (0.22)	13 (0.23)	15 (0.25)	13 (0.22)
	Sub-total	139 (2.31)	145 (2.52)	165 (2.73)	149 (2.51)
C	**Total Cost (A+B)**	6022 (100.00)	5763 (100.00)	6035 (100.00)	5940 (100.00)
D	**Production in No of cocoon**	9749	10194	9540	9828

Figure in parenthesis shows percentage of total cost

Fixed cost of tasar cocoon production consists with depreciation of rearing equipments and interest on fixed capital at the rate of 10% per annum. Depreciation of rearing equipments in Tindni , Gajipur and Babeha villages were Rs 126, 132 and 150 respectively and at over all level was Rs 136. The total fixed cost incurred in tasar cocoon production in Tindni, Gajipur and Babeha villages (were Rs 139 , 145 and 165) respectively and at Sover all level was Rs 149. Hence total cost were Rs 6022, 5763 and 6035 in Tindni , Gajipur and Babeha villages of Mandla block respectively. The average of tatal cost was Rs 5940

5.3.4 Returns from Tasar cocoon production

The returns from rearing 100 DFL of tasar have been worked out and are presented in Table 5.9. The results in the Table indicate that the returns realised from the sale of cocoons (9749 , 10194 and 9540 in numbers) produced from 100 DFL were Rs 9749 , 10194 and 9540 in Tindni , Gajipur and Babeha villages , respectively and at overall level Rs 9828 in Tindni , Gajipur and Babeha villages , respectively at the rate of Rs 1 per cocoon. The net returns obtained over total cost were Rs3727, 4431 and 3505 in Tindni , Gajipur and Babeha villages, respectively and at overall level, Rs 3888. The net returns obtained over operational cost were Rs 3866, 4576 and 3670 respectively and at overall level Rs 4073. The Benefit: Cost ratio worked out to 1.62, 1.77 and 1.58 for Tindni, Gajipur and Purva villages and at overall level 1.81 respectively. For making one cocoon of tasar Rs 0.62, 0.57 and 0.63 were needed in Tindni, Gajipur and Babeha villages, respectively and at overall level, Rs 0.60.

Table 5.9 Returns from and Tasar cocoon production

S. No.	Particular	Tasar			Over all
		Tindni	Gajipur	Babeha	
1.	Total cost	6022	5763	6035	5940
2.	Gross income	9749	10194	9540	9828
3.	Net income over (a)operational cost	3866	4576	3670	3888
	(b) total cost	3727	4431	3505	3670
4.	Benefit cost ratio	1.62	1.77	1.58	1.65
5.	Cost of production (Rs)	0.62 per No	0.57 0.63 per No	0.60 0.63 per No	0.60 per No

5.3.5 Break – Even Analysis of Production and Cost of Mulberry and Tasar Cocoon in Sample Farm

Break – even production is a point at which no profit and no loss means revenue is equal to profit.

Table 5.10 revealed that the gap between existing production and beak – even production of mulberry cocoon was ranged from 17.32 kg (49%)in Purva and 17.32 kg (47%) in Tindni village and gap between existing cost and beak – even cost highest in Purva 49 percent. Similarly, the gap between existing production and beak – even production of tasar cocoon ranged from3505 (58%) in Babeha and 4431 (62%) in Gajipur village and gap between existing cost and beak – even cost highest in Gajipur (77%) followed by Tindni (62%) and Babeha (58%).

Table 5.10 Break – Even Analysis of Production and Cost of Mulberry and Tasar Cocoon in Sample Farm

S. No.	Particular		Villages			
			Tindni	Gajipur	Purva	Babeha
1.	**Mulberry**					
	I. Production (Kg)	(a) Existing production	54.54	50.23	39.07	
		(b) Break-even production	37.22	*33.90*	26.30	
		(c) Gap	17.32 (47)	16.34 (48)	12.77 (49)	
	II. cost (Rs/kg)	(a) Existing cost	100	100	100	
		(b) Break-even cost	68.24	67.49	67.32	
		(c) Gap	31.76 (47)	32.51 (48)	32.68 (49)	
2.	**Tasar**					
	I. Production (No of cocoon)	(a) Existing production	9749	10194		9540
		(b) Break-even production	6022	5763	_	6035
		(c) Gap	3727 (62)	4431 (77)	_	3505 (58)
	II. cost (Rs /cocoon)	(a) Existing cost	1	1		1
		(b) Break-even cost	0.62	0.57		0.63
		(c) Gap	0.38 (61)	0.48 (84)		0.37 (59)

Figure in parenthesis shows percentage of gap

5.4 Yield gaps in cocoon production

As mentioned in the previous chapter, the present study was conducted in the three villages of mulberry Mandla block predominately sericulture practicing districts of M.P. Tindni, Gajipur and Purva. In the present study, attention was focussed only on the hybrid multivoltine represented by B1 KANVA2 S1633 variety which was reared extensively in that areas of the study region. The data pertaining to the performance of hybrid multivoltine at the research station and the data on 8 demonstration plots were considered for the present study. The farmers' data were collected by personal Interview method.

Table 5.11 Realised yield levels and estimated yield gaps in mulberry cocoon production

(Kg per 100dfl)

S. No.	Particular	Village			Over all
		Tindni (N=15)	Gajipur (N=15)	Purva (N=15)	
1.	Potential yield (kg)	80	80	80	80
2.	Farm yield (kg)	76.6	76.6	76.6	76.6
3.	Farmer's field yield (kg)	54.54	50.23	39.07	47.95
4.	Gap-I(kg)	3.4	3.4	3.4	3.4
5.	Gap-II(kg)	22.06	26.37	37.53	28.65
6.	Total yield gap(kg)	25.46	29.77	40.93	32.05

Table 5.12 Estimated Yield Gaps inTasar Cocoon Production

(No of cocoon per 100 DFLs)

S. No.	Particular	Village			Over all
		Tindni (N=15)	Gajipur (N=15)	Babeha (N=15)	
1.	Yield in experimental farm	17220	17220	17220	17220
2.	Farmer's yield	9749	10194	9540	9827.67
3.	Yield gap	7471 (43.38)	7026 (40.80)	7680 (44.59)	7393 (42.92)

Figure in parenthesis shows percentage of yield gap

5.4.1 Mulberry and Tasar Cocoon Yield Gap in the Study Area

The estimated yield gaps in silk cocoon are presented in Table 5.11. Yield Gap-I referred to the difference between the potential yield and the potential farm yield. The difference between the potential farm yield and the actual yield on the sample farms was referred to as Yield Gap-II. The total yield gap was the difference between the potential yield and the actual yield on the sample farms

The realised yield of mulberry cocoons in Kg. per 100 DFL is presented in Table 5.11. The potential yield of silk cocoon (yield at research stations) for the entire region was found to be 80.00 Kg per 100 DFL. The overall potential farm yield of silk cocoon (yield at demonstration plots) was found to be 76.60 Kg per 100 DFL. The productivity of cocoons in Tindni villege was found to be slightly higher (54.54 Kg/100 DFL) than that of other two villages namely Gajipur (50.23 Kg/ 100 DFL) and Purva (39.07 Kg/ 100 DFL). The overall productivity of silk cocoons was found to be 47.95 Kg per 100 DFL.

As observed by the table 5.11, the productivity of mulberry cocoon in Tindni village was slightly higher than that in Gajipur and Purva. There was a difference between the potential yield and actual yield of silk cocoon was 25.46 Kg/ 100 DFL and between the potential farm yield and the actual yield was 22.06 Kg/ 100 DFL. But productivity in Purva village is relatively very low. There was a huge difference between the potential yield and actual yield of silk cocoon observed to be 40.93 Kg/ 100 DFL and between the potential farm yield and the actual yield was 37.53 Kg/ 100 DFL

The yield of tasar cocoon in numbers per 100 DFL is presented in the table 5.12. Yield of tasar in experimental farm in control condition was 17220. As revealed by the table productivity of tasar cocoon in Gajipur village (No 10194 per 100 DFL) was higher than that of two villages namely Tindni (No 9749 per 100 DFL) and Purva (No 9540 per 100 DFL). The overall productivity of silk cocoons was found to be No 9828 per 100 DFL.

The table 5.12 showed that yield gap due to environmental condition and management practices ranged between in the Gajipur were (7026(40.80 percent) with higher in the Purva village 7680(44.59 percent).

5.13 Estimated indices of yield gaps in Mulberry cocoon production

Unit - percents

S. No.	Particulars	Tindni	Gajipur	Purva	Over all
1.	Index of yield gap	31.83	37.21	51.12	40.05
2.	Index of realised potential yield	68.18	62.79	48.84	59.94
3.	Index of realised potential farm yield	71.20	65.57	48.99	61.92

Various yield gap indices in silk cocoon production were worked out and the same are presented in Table 5.13. The index of yield gap was defined as the ratio of difference between the potential yield and the actual yield to the potential yield, expressed in percentage. This ratio indicated the extent of unrealised yield potential. The data presented in the table indicated that the index of yield gap in silk cocoon production vary substantially among the villages. There was huge difference in the yield of cocoon overall index of yield gap was estimated at 40.05 per cent.

The index of realised potential yield, defined as the ratio of actual yield to the potential yield, expressed in percentage. The overall index of realised potential yield in silk cocoon production in the selected villages was estimated to be 59.94 per cent. The indices of realised potential yield in mulberry cocoon production in Tindni, Gajipur and Purva were 68.18, 62.79 and 61.92per cent respectively, indicating higher difference among the villages. However, slightly higher index of realised potential yield was noticed in Tindni village.

The index of realised potential farm yield was defined as the ratio of actual yield to potential farm yield, expressed in percentage. The indices of realised potential farm yield presented in Table 5.13 indicated that the farmers, overall, were successful in exploiting the potential farm yield of silk cocoon to the extent of 61.92 per cent. It could be further seen from the table that index of realised potential farm yield were differ in that three villages i.e., 71.20, 65.57 and 48.99 percent. The percentage of exploitation of the potential farm yield of silk cocoons is varied in the selected villages.

5.5 Employment Generation in Mandla Block

Sericulture generates a chain of economic activities providing employment opportunities to the people in rural, urban

and semi-urban areas. Through sericulture the incidence of unemployment, disguised unemployment and seasonal unemployment is relieved to some extent, especially in the agricultural sector. Employment opportunities in the sericulture can be classified into agricultural and industrial according to their nature. Mulberry cultivation, silkworm rearing and cocoon production are agricultural and can be taken up in rural areas. Silk reeling, twisting, weaving, dyeing etc., are industrial activities and can be undertaken in urban and semi-urban areas.

In this section, an attempt is made to analyse the involvement of labour in various operations from planting to harvested cocoons (per 100 DFLs of mulberry) reared from one acre and same has been presented in the Table5.14. Table 5.14 reveals that the establishment of one acre mulberry garden for rearing 100 DFLs of mulberry silkworms in one months generates 119.2 man hour of employment, of which 73.57 per cent are being women labourers. It is also clear that the involvement of women has been higher in all activities of sericulture when compared to men except in field preparation of mulberry. Weeding, transport of mulberry leaves to the rearing sheds, cocoon sorting and rearing of worms are the important activities where men's and women's involvement are creating an employment of 3.1, 2.1and 0.1 and 13.2, 4.2and 9.1 man hour respectively to the men and women. Feeding of worms and Planting of mulberry creates an employment of 3.0 and 4.1man hour 7.4 and 8.8 man hour per 100 DFLs to the men and women respectively. Marketing and leaf harvest and chopping are the other important activities which create an employment of 1.5 and 2.4 man hour for men and 6.26 and 4.4 man hour to the women respectively. Preparation of the field for growing mulberry creates an employment of 13.7 man hour of which 9.1 man hours are for men and 4.6 man hours are for women. Thus, weeding, transport of mulberry leaves to the

Table 5.14: The labour involvement of mulberry silkworms reared from one acre of mulberry from 100 DFLs

Operation	Labour involvement in mulberry											
	Male				Female				Total labour/100DFLs			
	Tindni	Gajipur	Purva	Over all	Tindni	Gajipur	Purva	Over all	Tindni	Gajipur	Purva	Over all
Field pre -paration	10.38	9.41	7.58	9.1	6.39	3.72	3.66	4.6	16.77	13.13	11.24	13.7
Planting	3.89	4.3	4.09	4.1	10.58	8.24	7.47	8.8	14.47	12.54	11.56	12.9
Fertilizer application	3.55	4.12	2.77	3.5	7.89	5.48	3.83	5.7	11.44	9.6	6.6	9.2
Weeding	3.19	2.98	3.08	3.1	22.38	19.56	12.2	18.0	25.57	22.54	15.28	21.1
Leaf har –vest and chopping	3.15	2.42	1.73	2.4	5.31	4.1	3.7	4.4	8.46	6.52	5.43	6.8
Transport of mulberry leaves	2.33	2.15	1.9	2.1	15.21	13.42	10.84	13.2	17.54	15.57	12.74	15.3
Cocoon sorting	0.06	0.05	0.16	0.1	6.1	4.31	2.11	4.2	6.16	4.36	2.27	4.3
Rearing	2.64	1.91	1.78	2.1	10.23	10.03	7.13	9.1	12.87	11.94	8.91	11.2
Brushing	0.13	0.21	0.17	0.2	1.93	1.93	1.93	1.9	2.06	2.14	2.1	2.1
Feeding	2.91	3.1	3	3.0	8.36	7.01	6.93	7.4	11.27	10.11	9.93	10.4
Mounting	0.39	0.32	0.35	0.4	5.61	3.78	1.67	3.7	6	4.1	2.02	4.0
Marketing	1.15	1.76	1.45	1.5	5.11	8.92	6.01	6.7	6.26	10.68	7.46	8.1
Total	33.77	32.73	28.06	31.5	105.1	90.5	67.48	87.7	138.87	123.23	95.54	119.2

Table 5.15: The employment involvement of tasar silkworms reared from 100 DFLs

Operation	Labour involvement in tasar											
	Male				Female				Total labour/100DFLs			
	Tindni	Gajipur	Purva	Over all	Tindni	Gajipur	Purva	Over all	Tindni	Gajipur	Purva	Over all
Chawki rearing	9.25	11.78	9.98	10.3	6.45	9.76	6.21	7.5	15.7	21.54	16.19	17.8
Maintaining plantation	27.67	22.34	25.34	25.1	21.78	22.84	18.61	21.1	49.45	45.18	43.95	46.2
Chemical application	4.32	5.43	5.76	5.2	6.31	7.61	7.89	7.3	10.63	13.04	13.65	12.4
Weeding	32.56	35.91	33.29	33.9	38.12	37.52	41.33	39.0	70.68	73.43	74.62	72.9
brushing	4.59	3.12	5.86	4.5	7.02	8.97	5.76	7.3	11.61	12.09	11.62	11.8
Transferring of silk worm	32.98	32.21	35.72	33.6	20.22	22.71	19.34	20.8	53.2	54.92	55.06	54.4
Harvestig	13.23	11.68	14.71	13.2	19.43	16.13	14.39	16.7	32.66	27.81	29.1	29.9
Marketing	8.1	6.76	8.03	7.6	3.68	6.56	5.29	5.2	11.78	13.32	13.32	12.8
Total	132.7	129.23	138.69	133.5	123.01	132.1	118.82	124.6	255.71	261.33	257.51	258.2

rearing sheds and rearing of worms are the important activities where women's involvement is higher creating an employment of 18.0, and 13.2 man hours per 100 DFLs respectively. Preparation of field for mulberry growing is the only activity where the men labour involved exceeds women labour involvement.

In this table, an attempt is made to analyse the involvement of labour in various operations from maintaining to harvested cocoons (per 100 DFLs of tasar) reared on Arjun and Saj plant has been presented in the Table 5.15. Table 5.15 revealed that the maintained of Arjun and saj plant for rearing 100 dfls of tasar silkworms in 45 days generates 258.2 man hour of employment, of which 51.17 per cent were men and 48.25 per cent are being women labourers. Chawki rearing and maintaining plantation are the important activities which create an employment of 10.3 and 25.1 man hour for men and 7.5 and 21.1 man hour respectively to the women. Weeding, chemical application and brushing of worms are the important activities where men's and women's involvement are creating an employment of 33.9, 5.2and 4.5 and 39.0, 7.3 and 7.3 man hour respectively to the men and women. Transferring of worms and harvesting of tasar cocoon creates an employment of 33.6 and 13.2 man hour 20.8 and 16.7 man hour per 100 DFLs to the men and women respectively. Marketing is the other important activity which creates an employment of 7.6 and 5.2 man hours for men and women respectively.

5.6 Constraints in cocoon production

The responses of the farmer respondents of mulberry cocoon grower regarding the constraints for getting higher yields are indicated in Table 5.16. The results revealed that water problem and high temperature during summer season, pest (yellow fly, konthikona red ant etc.) and disease of silk worms, lack of technical guidance, high wage rates of labour, improper disinfection of the rearing house and Non availability of good

leaves were the most serious constraints perceived by the farmers to the realisation of potential cocoon yields.

Table 5.16 Constraints in Mulberry cocoon production

S. No.	Particulras	Village			Over all	Rank
		Tindni	Gajipur	Purva		
1.	Non availability of good leaves	7	6	5	18 (40)	VI
2.	Difficultiy in obtaing good DFLs	2	3	2	7 (16)	IX
3.	High cost of silk rearing equipments	3	4	3	10 (22)	VII
4.	Difficulty in procuring stands, trays, mountages etc	3	3	2	8 (18)	VIII
5.	Improper disinfection	8	7	6	21 (46)	V
6.	Non availability of inputs in time.	6	7	5	18 (40)	VI
7.	Pests and diseases of silk worms	12	13	13	38 (84)	II
8.	Shortage and high wage rates of labour	10	8	7	25 (56)	IV
9.	Lack of technical guidance	11	12	12	35 (78)	III
10.	Water problem and high temperature during summer	14	15	11	40 (89)	I

Figure in parenthesis shows percentage of constraint

As high as 89 per cent of the respondents perceived that the water problem and high temperature during summer season was the major constraint for not attaining the potential yield, followed by pest and disease of silk worms 84 percent, and lack of technical guidance (78 percent) Shortage and high wage rates of labour (56 per cent), more than 47 per cent of respondents were unhappy with improper disinfection of rearing house and Non availability of good leaves (40%) About 40 per cent of the respondents were felt that problem of non availability of inputs in the time, high cost of silkworm rearing equipments (22.2 per cent) (2 About 18.33 per cent of the respondents felt that a difficulty in obtaining DFL (15.5 per cent) were the other reasons for not getting the potential yield.

The responses of the farmer respondents of tasar cocoon grower regarding the constraints for getting higher yields are indicated in Table 5.17. The results revealed that water problem and high temperature during summer season, pest (yellow fly, konthikona red ant bird ,snake etc.) and disease of silk worms, Lack of technical guidance, shortage high wage rates of labour non availability of good leaves, improper disinfection of the rearing house and were the most serious constraints perceived by the farmers to the realisation of potential cocoon yields.

As high as 87 per cent of the respondents perceived that the water problem and high temperature during summer season was the major constraint for not attaining the potential yield, followed by pest shortage and disease of silk worms 84 percent, and lack of technical guidance , and Non availability of good leaves (60 percent) high wage rates of labour (56 per cent), About 40 per cent of the respondents were felt that problem of non availability of inputs in the time (44 percent) , about 47 per cent of respondents were unhappy with improper disinfection of rearing house (40 per cent) shortage and high wage rates of labour (38 percent) . About 18 per cent of the respondents felt that a difficulty in obtaining DFL were the other reasons for not getting the potential yield.

Table 5.17 Constraints in tasar cocoon production

S. No.	Particulars	Village			Over all	Rank
		Tindni	Gajipur	Babeha		
1.	Non availability of good quality leaves	9	8	10	27 (60)	IV
2.	Difficulty in obtaining DFLs	2	2	4	8 (18)	VIII
3.	Pests and diseases of silk worms	12	13	13	38 (84)	II
4.	Improper disinfection	5	6	7	18 (40)	VI
5.	Shortage and high wage rates of labour	5	6	6	17 (37)	VII
6.	Lack of technical guidance	8	9	11	28 (62)	III
7.	Water problem and high temperature during summer	14	15	10	39 (87)	I
8.	Non availability of inputs in time	6	5	9	20 (44)	V

Figure in parenthesis shows percentage of constraint

CHAPTER-VI

SUMMARY, CONCLUSION AND SUGGESTION FOR FUTURE WORK

6.1 Introduction

Sericulture is an important agro based cottage industry with enormous potential of generating employment and earning handsome foreign exchange for the country. Madhya Pradesh produced 752 tons of cocoon of mulberry silk harvested in 3281 acres and 700 lakh cocoon of tasar silk during the year 2009-10. Mandla district has been one of the important districts on the sericultural map of Madhya Pradesh .In Mulberry and Tasar Cocoon rearing accounted 4.29 percent of the total production and 8.96 percent of total area under mulberry cocoon and 2.85 percent of total tasar cocoon of the state. Even though the production level has increased significantly in the recent past there still exists a wide gap between the actual yield obtained and actually possible with the existing technology. Hence the crux of the problem is to study costs and return from rearing of silkworm and and how to increase the output per unit and thereby reducing this gap. The specific objectives of the study are

1. To study the trends and growth rate of mulberry and tasar cocoon production in Mandla district.
2. To analyse the comparative cost and returns of mulberry and tasar cocoon production.
3. To quantify the yield gaps and identify the constraints in cocoon production.
4. To suggest appropriate policy measures for the development of sericulture in study area

6.2 Materials and Methods

The present study is confined to potential sericulture grown Mandla block of Mandla district, Madhya Pradesh. Three villages having maximum mulberry production namely Tindni, Gajipur and Purva and in addition one more village Babeha were selected for tasar. Samples of 15 sericulturist who grow mulberry were selected randomly. Similarly 15 tasar cocoon producer from selected villages were chosen. Thus sample respondent consists of 90 in total mulberry. The study required both secondary and primary data to achieve. The stated objectives secondary data regarding area, production and productivity of mulberry and tasar cocoon covering a decade period ending 2009 – 10 were collected from publication of Directorate of Sericulture, Madhya Pradesh. Similarly required primary data pertains to the period 2011-12 were collected by personal interview of selected respondent using pre – tested question – schedule. Absolute and relative change, index number, trend simple and compound growth rate, cost of cultivation, gross income, net income, benefit cost ratio cost of production, break even production and cost, yield gap I and II mean and percentage techniques were used to analysed the collected data.

6.3 Major findings

1. Mandla district witnessed increase in area, production and productivity of mulberry which is ultimately affected the production. An absolute increase in the component of mulberry production was remarkable during the period where reference when production increase by 169 percent with an increase of 12 percent in area and more than 112 percent increase in yield.

   Tasar acerage during the decade period in the study area was constabut the production and yield increased by 504 percent respectively. This is glaring example of intensive production of tasar.

2. The compound growth rates for mulberry production (15.54%) and productivity (13.71%) also positive and significant although acerage increasing non significant at the rate of 1.35 percent. Tasar cocoon production and productivity recorded the growth rates per annum of 52.58 percent. Per annum growth rates mulberry and tasar cocoon was relatively more than simple growth rate.
3. Sample profile was characterised by 6.24 members of average size of family which ranged between 6.07 in Purva to 6.53 in Gajipur village. The strength of the family in selected village of tasar cocoon ranged between 5.80 to 6.53. Education in the selected villages were not adequate 18 to 20 per cent of the total respondents in mulberry villages against 13 to 22 percent in tasar villages selected. Sericulture was the main occupation of the sample respondents.
4. As regard cost of 100 DFLs of mulberry cocoon production it was Rs. 3247 on over all sample farm which ranged Rs 2630 in Purva village to Rs 3722 in Tindni. Operational cost was 62.33 percent and total fixed cost was 37.65 percent of the total cost. Out of the total operational cost labour cost accounting higher cost to be 35.48 percent followed by fertilizer (10.35%). The level of mulberry production was found significantly higher in Tindni village followed by Gajpur (50.23 kg) and Purva (39.07 kg). In relation to mulberry production the net income over total cost and cost of production were found higher in Tindni village as compared to Gajipur and Purva village. The level of net income in Purva village is quite low and calls for concern on part of planners to find out ways to increase this level.
5. As regard cost of 100 DFLs of tasar cocoon production it was Rs. 5940 on over all sample farm which ranged Rs 5763 in Gajipur village to Rs 6035 in Babeha. Operational cost was 97.47 percent and total fixed cost was 2.51 percent of the total cost. Out of the total operational cost labour cost accounting higher cost to be 43.47 percent

followed by material cost require for maintaing plantation 35.49 percent. The level of tasar production was found significantly higher in Gajipur village followed by Tindni (9749 No. of cocoon) and Babeha (9540 No. of cocoon). In relation to tasar production the net income over total cost and cost of production were found higher in Gajipur village as compared to Tindni and Babeha village. The level of net income in Babeha village is quite low and calls for concern on part of planners to find out ways to increase this level.

6. Yield Gap-I was found to be 3.4 kg against yield gap II was found to be 28.65 kg as mulberry cocoon production. This could be attributable to non-adoption of recommended package of practices.
7. The overall index of yield gap was estimated at 40.05 per cent. This shows that farmer in the study area can still increase cocoon yield at least by 40 per cent. The index of realised potential yield was found to be 59.94 per cent. While potential farm yield was to the 61.92 per cent. This means that potential farms were realising most part of the potential yield.
8. Yield Gap of tasar cocoon production was found to be 7393 (42.92 per cent). Such a yield gap could be resulted of the environmental conditions and other infrastructural facilities available in the multiplicational trials of tasar cocoon production.
9. The water problem and high temperature during summer season attack of pests and diseases, inadequate technical guidance from extension personnel high wage rates of labour, improper disinfection of rearing house and rearing equipments etc were the major problems reported by mulberry growers.
10. The water problem and high temperature during summer season were the major constraint in the tasar production followed by pest shortage and disease of silk worms, lack of technical guidance and Non availability of good leaves high wage rates of labour etc.

6.5 Suggestion for Future Work

Based on the findings the study, following suggestions has been offered for augmenting the production of sericulture in the study area.

1. The growth rate analysis has clearly indicated that the area and yield under mulberry in the study area, increasing significantly, which in turn affected the production of silk cocoons. Since the net profit earned in silkworm rearing was highly encouraging, hence there is scope to increase area under mulberry, the production of cocoons could be increased and the farmers could get higher earnings.
2. The analysis showed that the efficient use of production inputs had substantially contributed to the yield gaps. The use of mountages, paraffin paper and disinfectants by grower was alternative. Hence, cultivator should be properly aware about alternatives use of inputs. The sericulture extension agencies have greater role to play in this direction. Subsidy to the sericulture may be given in the form of supply of inputs such as DFLs, disinfectants chemicals, rearing equipment etc.
3. Since the Yield Gap-I is lower than Yield Gap-II, more demonstrations in the farmers field can be arranged to demonstrate yield potential and motivate farmer to adopt same practices to harvest good cocoon yield.
4. Majority of the farmers in the study area opined that attack of pests and diseases, improper disinfection and shortage of human labour were the major constraint in silk cocoon production. Hence, extension agents should give more importance in educating farmers about better protection measures and proper disinfection methods. Farmers should also be educated about optimal use of labour.
5. Illiteracy and lack of technical knowledge on part of farmers about recommended practices prevented them from

exploiting the greater farm potential. Hence, farmers must not only be educated but also encouraged to adopt recommended practices and technology to the full extent. Extension programmes must be carefully designed to make them effective in convincing the farmers. It is needless to say that farmers' assessment of constraints, possible technology and policy options will be prerequisite to bring out any desirable changes. Therefore, the perception and views of the farmers need to be considered at each stage by researchers, policy makers and extensionists..

Production	Productivity	year	area		
4512.73	70.161	2000-01	64.857		
6160.39	92.701	2000-02	65.844		
7808.05	115.241	2000-03	66.831		
9455.71	137.781	2000-04	67.818		
11103.37	160.321	2000-05	68.792		
12751.03	182.861	2000-06	69.792		
14398.69	205.401	2000-07	70.779		
16046.35	227.941	2000-08	71.766		
17694.01	250.481	2000-09	72.753		
19341.67	273.021	2000-10	73.74		

year	area	Production	Productivity
2000-01	64.857	4512.73	70.161
2000-02	65.844	6160.39	92.701
2000-03	66.831	7808.05	115.241
2000-04	67.818	9455.71	137.781
2000-05	68.792	11103.37	160.321
2000-06	69.792	12751.03	182.861
2000-07	70.779	14398.69	205.401
2000-08	71.766	16046.35	227.941
2000-09	72.753	17694.01	250.481
2000-10	73.74	19341.67	273.021

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APPENDIX

Schedule for primary data collection from farmer.

(for Tasar cocoon production)

(I)General Information

1. Name : …… 2. Age : ……..

3. Type of family : Nuclear / Joint …… 4. Education : …….

5.Main occupation : Agriculture / Sericulture / Other (specify) …….

6.Village and Tehsil : ……. 7. District : ……..

Family Composition

S. No	Engaged in Agriculture	Engaged in Sericulture	Others	Total
1.	Male			
2.	Female			
3.	Children			

(III) Cost of Silk Rearing

S. No.	Item	No/ Qty	Value Rs	Labour used								
				Family			Hierd			Total		
				M	W	B	M	W	B	M	W	B
1.	Cost of DFls											
2.	Expenses toward purchase of DFLs											
3.	Cost of disintifects											
4.	Cost of paraffin paper											
5.	Uzi fly net											
6.	Hire charges on rearing stand											
6.	Cost of human labour											
7.	Marketing cost											
8.	Other											

Where M=Man, W= Woman, B= Bullock labour

(IV) Return From Silk Worm Rearing

Date of Harvesting

S. No.	Output	Qty Produced	Price (Rs/kg)	Total Value (Rs)
1.	Good cocoon (kg)			

(V) Constraints Occure In Cocoon Production

1. Non availability of good quality leaves
2. Difficulty in obtaining DFLs
3. High cost of silk rearing equipments
4. Difficulty in procuring stands, trays, mountages etc.
5. Improper disinfection.
6. Non availability of inputs in time.
7. Pests and diseases of silk worms.
8. Shortage and high wage rates of labour.
9. Lack of technical guidance.
10. Water problem and high temperature during summer
11. Others (specify)

Schedule for primary data collection from farmer.

(for Tasar cocoon production)

(I)General Information

1. Name : ……. 2. Age : ……..

3. Type of family : Nuclear / Joint …… 4. Education : …….

5.Main occupation : Agriculture / Sericulture / Other (specify) …….

6.Village and Tehsil : ……. 7. District : ……..

Family Composition

S. No	Engaged in Agriculture	Engaged in Sericulture	Others	Total
1.	Male			
2.	Female			
3.	Children			

(III) Cost of Silk Rearing

S. No	Item	No /Qty	Value Rs	Labour used								
				Family			Hierd			Total		
				M	W	B	M	W	B	M	W	B
1.	Cost of DFls											
2.	Expenses toward purchase of DFLs											
3.	Cost of disintifects											
4.	Cost of paraffin paper											
5.	Uzi fly net											
6.	Hire charges on rearing stand											
6.	Cost of human labour											
7.	Marketing cost											
8.	Other											

Where M=Man, W= Woman, B= Bullock labour

(IV) Return From Silk Worm Rearing

Date of Harvesting

SNo	Output	Qty Produced	Price (Rs/kg)	Total Value (Rs)
1.	Good cocoon (kg)			

(V) Constraints Occure In Cocoon Production

1. Non availability of good quality leaves
2. Difficulty in obtaining DFLs
3. High cost of silk rearing equipments
4. Difficulty in procuring stands, trays, mountages etc.
5. Improper disinfection.
6. Non availability of inputs in time.
7. Pests and diseases of silk worms.
8. Shortage and high wage rates of labour.
9. Lack of technical guidance.
10. Water problem and high temperature during summer
11. Others (specify)

Schedule for primary data collection from farmer.
(for mulberry cocoon production)

(2)General Information

1. Name : ……. 2. Age : ……..

3. Type of family : Nuclear / Joint …… 4. Education : …….

5. Main occupation : Agriculture / Sericulture / Other (specify) …….

6.Village and Tehsil : ……. 7. District : ……..

Family Composition

S. No	Family Member	Relation with Respondent	Engaged in Agriculture	Engaged in Sericulture	Others	Total
1.			Male			
2.			Female			
3.			Children			

(II) Farm Inventory Position

(A) Land Inventory

S. No.	Particulars	Dry Land		Irrigated Land		Source of irrigation *
		Area	Land value /Rent(Rs/ac)	Area	Land Value /Rent(Rs/ac)	
1.	Total Area Owened					
2.	Leased in					
3.	Leased out					
4.	Fallow land					
5.	Area Under Cultivation					

*Canal / Tank / Open Well / Tube Well / Others (specify)

(B) Farm Building

S.No.	Item	Number	Year of Construction	Construction Cost	Present Value
1.	Dwelling House				
2.	Farm House				
3.	Cattle house				
4.	Poultry house				
5.	Pump house				
6.	Preserving chamber				
7.	Rearing house				
8.	Othersif any specify				

(c) Farm Machinery and Equipments

S. No	Item	Numbers	Year of Purchase	Purchase Value	Present Value
1.	Tractor				
2.	Iron Plough				
3.	Wooden Plough				
4.	Harrow				
5.	Hoe				
6.	Seed drill				
7.	Bullock cart				
8.	Pump set				
9.	Sprayers				
10.	Duster				
11,	Other				

(C) Silk Worm Rearing Equipment

S. No.	Item	Year of Purchase /construction	Expected Life(year)	Cost of construction /purchase (Rs)	Present Value	Depriciation
1.	Rearing House					
2.	Equipment					
	(a) General srayers					
	(b) Uzicide sprayer					
	(c) Duster					
3.	Rearing Trays					
4.	Uzitify net					
5.	Rearing stands					
6.	Mountages					
7.	Leaf cutting knives					
8.	Miscellaneous					

(III) Cost of Silk Rearing

(a) Labour Cost

S. No	Item	No/ Qty	Value Rs	Labour used								
				Family			Hierd			Total		
				M	W	B	M	W	B	M	W	B
1.	Expenses toward purchase of DFLs											
2	Chawki Rearing cost											
3.	Plucking and transportation of leaf											
4.	Hire charges on mountages											
5.	Hire charges on chopping knives											
6.	Hire charges on rearing stand											
7.	Cost of human labour											
8.	Marketing cost											
9.	Other											

Where M=Man, W= Woman, B= Bullock labour

(b) Material Cost

S No	Item	No/ Qty	Value Rs	Total
1.	Cost of DFLs			
2.	Cost of paraffin paper			
3.	Cost of disintifects			
4.	Uzi fly net			
5.	Hire charges on trays			
6.	Hire charges on rearing stand			
7.	Mulberry leaves			
	Own			
	Purchased			
9.	Other			

(IV) Return From Silk Worm Rearing Date of Harvesting

SNo	Output	Qty Produced	Price (Rs/kg)	Total Value (Rs)
1.	Good cocoon (kg)			
2.	Litters (quintal)			

(V) Constraints Occure In Cocoon Production

1. Non availability of good quality leaves
2. Difficulty in obtaining DFLs
3. High cost of silk rearing equipments
4. Difficulty in procuring stands, trays, mountages etc.
5. Improper disinfection.
6. Non availability of inputs in time.
7. Pests and diseases of silk worms.
8. Shortage and high wage rates of labour.
9. Lack of technical guidance.
10. Water problem and high temperature during summer
11. Others (specify)

ABSTRACT

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ABSTRACT

The present study on “Economic Analysis of Yield Gap and Constraints in Sericulture Cocoon Production in Mandla District of Madhya Pradesh.” Was under taken with a view to examine the trend and growth rates along with cost and return, profitability, yield gap and constraints in mulberry and tasar production in Mandla districtof M.P. A sample of 90 mulberry and tasar grower were selected randomly from the potential villages vizTindni, Gajipur, Purva and Babeha selected for the Mandla block of Mandla district (M.P.). The study required both primary and secondary data viz area, production and yield of both mulberry and tasar, collected from the sample respondents by survey method and Department of Sericulture, Mandla (M.P.) covering a decade of period ending 2009-10. Absolute and relative change, index number, linear trend, simple and compound growth rate, cost of production profitability concept, yield gap analysis and rearing techniques were employed to analysed the collected data.

The study revealed that production and productivity of both mulberry and tasar cocoon increased significantly while tasar area remain constant. Production growth rate was relatively more than area and yield. Total cost of mulberry and tasar cocoon for 100 DFLs sample farms was estimated to be Rs 3247 and Rs 5940 respectively. Share of operational and fixed cost of mulberry was to extended of 62.33 and 37.65 percent. Tasar cocoon production was estimated to be more profitable than mulberry production. Break – even production and yield indicated that existing prodcution and cost were observed to be much lower than the existing production yield level. Tasar production was found to be profitable than mulberry production revealed by higher net income and benefit cost ratio. Yield gap II was observed to be much higher than yield gap I indicating wide gap in potential yields and farmers field yield.

Thus on the basis of above findings it is suggested that timely supply of inputs reasonable output price and constraints be minimized which augment the production of mulberry and tasar in the study area.

VITA

The author of this thesis **Ms. Riti Tiwari D/O Shri R. P.Tiwari** was born on 2nd June 1987 at District Mandla (M.P.). She passed his Higher Secondary Examination of the Board of secondary Education Madhya Pradesh, Bhopal in the year 2005 with 93% marks.

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For the partial fulfillment of the Master's degree programme he was allotted a research problem on **"Economic analysis of yield gap and constraints in sericulture cocoon production in Mandla district of Madhya Pradesh"** which was successfully conducted by her and being submitted in the form of this thesis.