ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF LAC IN RANCHI DISTRICT OF JHARKHAND STATE

MANJISHA SINHA

B.Sc. (Ag.)

MASTER OF SCIENCE IN AGRICULTURE
(AGRICULTURAL ECONOMICS)

2017

ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF LAC IN RANCHI DISTRICT OF JHARKHAND STATE

BY

MANJISHA SINHA

B.Sc. (Ag.)

THESIS SUBMITTED TO THE
ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE OF

MASTER OF SCIENCE IN AGRICULTURE

(AGRICULTURAL ECONOMICS)

CHAIRPERSON: Dr. N. VANI

DEPARTMENT OF AGRICULTURAL ECONOMICS
SRI VENKATESWARA AGRICULTURAL COLLEGE, TIRUPATI
ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
GUNTUR – 522 509, A.P.

2017

DECLARATION

I, **MANJISHA SINHA** hereby declare that the thesis entitled "**ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF LAC IN RANCHI DISTRICT OF JHARKHAND STATE"** submitted to the **Acharya N.G. Ranga Agricultural University** for the degree of **Master of Science in Agriculture** is the result of original research work done by me. I also declare that no material contained in the thesis has been published earlier in any manner.

Place :Tirupati **(MANJISHA SINHA)**
Date : **I.D.No. TAM/2015-15**

CERTIFICATE

This is to certify that **Miss. MANJISHA SINHA** has satisfactorily prosecuted the course of research and that the thesis entitled "**ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF LAC IN RANCHI DISTRICT OF JHARKHAND STATE"** submitted is the result of original research work and is of sufficiently high standard to warrant its presentation to the examination. I also certify that neither the thesis nor its part thereof has been previously submitted by her for a degree of any university.

Place :Tirupati
Date :

(Dr. N. VANI)
Chairperson
Assistant Professor
Dept. of Agricultural Economics
S.V. Agricultural College
Tirupathi–517502,A.P.

CERTIFICATE

This is to certify that the thesis entitled "**ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF LAC IN RANCHI DISTRICT OF JHARKHAND STATE"** submitted in partial fulfilment of the requirements for the degree of **MASTER OF SCIENCE IN AGRICULTURE** of the Acharya N.G. Ranga Agricultural University, Guntur is a record of bonafide research work carried out by **Miss. MANJISHA SINHA** under our guidance and supervision.

No part of the thesis has been submitted by the student for any other degree or diploma. The published part and all assistance and help received during the course of investigations have been duly acknowledged by the author of the thesis.

Thesis approved by the Student Advisory Committee

Chairperson : **Dr. N. VANI**
Assistant Professor
Department of Agricultural Economics
S.V. Agricultural College,
Tirupati–517502, A.P. _____

Member : **Dr. S. RAJESWARI**
Assistant Professor and Head
Department of Agricultural Economics
S.V. Agricultural College,
Tirupati–517502, A.P. _____

Member : **Dr. G. MOHAN NAIDU**
Associate Professor and Head
Dept. of Statistics and Mathematics
S.V. Agricultural College,
Tirupati–517502, A.P. _____

Member : **Dr. S. R. KOTESWARA RAO**
Professor and Head
Department of Entomology
S.V. Agricultural College,
Tirupati–517502, A.P. _____

Date of final viva–voce:

ACKNOWLEDGEMENT

It gives me immense gratification to place on records my profound gratitude and sincere appreciation to each and every one of those who have helped me in this endeavor.

I wish to place on record my profound sense of gratitude and heartfelt respect to ***Dr. N. Vani,*** *Assistant Professor, Department of Agricultural Economics, S.V. Agricultural college, Tirupati and Chairman of my Advisory Committee for her valuable guidance throughout the period of investigation. Her enthusiasm, concern, patience, perfection and constructive criticism have aroused my spirits to do more.*

I wish to express my deep sense of gratitude and appreciation to revered member of my advisory committee, ***Dr. S. Rajeswari,*** *Assistant Professor and head, Department of Agricultural Economics, S.V. Agricultural college, Tirupati. She has been a constant source of inspiration and strength and I am indebted to her for her excellent guidance, valuable suggestions.*

It was a great privilege to have ***Dr. G. Mohan Naidu,*** *Associate Professor and Head, Department of Statistics and Mathematics, S.V. Agricultural college, Tirupati, as member of my Advisory Committee. My sincere gratitude and heartfelt thanks for his valuable guidance and support for application of statistical tools.*

I wish to place a record of my sincere and heartfelt gratitude to ***Dr. S. R. Koteswara Rao,*** *Professor and Head, Department of Entomology, S.V. Agricultural college, Tirupati, for her constant encouragement, suggestions and valuable guidance as member of my Advisory Committee during the course of my study.*

I shall be grateful to ***Dr. R. K. Yogi,*** *Scientist (Agricultural economics), Transfer of Technology division, ICAR – Indian Institute of Natural Resins and Gums, Ranchi, for his patience, cordial help, valuable suggestions, support and inextinguishable encouragement.*

I am grateful to ***Dr. B. Aparna,*** *Assistant Professor, Department of Agricultural Economics, S.V. Agricultural College, Tirupati for her valuable suggestions .*

It has also been good fortune to have an excellent and experienced mentor in the form of ***Sri Dr. T.V. Neelakanta Sastry,*** *Professor and Head (Retd). Department of*

Agricultural Economics, S.V. Agricultural College, Tirupati for his keen interest, encouragement and valuable suggestions during the course of my study.

I owe a debt of gratitude to ***Dr. B. Prathapa Reddy****, Associate Professor and Head (Retd). Department of Agricultural Economics, S.V. Agricultural College, Tirupati for his help and valuable suggestions.*

I am thankful to ***Dr. M. Srikala,*** *Teaching Associate, Department of Agricultural Economics, S.V. Agricultural College, Tirupati.*

I wish to express my sincere gratitudes to ***Dr. I. Bhavani Devi,*** *Professor and Specialist officer, Institute of Agri- Business Management, Tirupati.*

I express my deep felt token of gratitude to ***Dr. P. Raghuram****, Professor and Head (Retd). Department of Agricultural Economics, S.V. Agricultural College, Tirupati.*

I sincerely accentuate my gratitude to ***Dr. Vishnu Shankar Rao****, Professor and University Head, Department of Agricultural Economics, Acharya N. G. Ranga Agricultural University, Guntur.*

I avail this opportunity to express my gratitude and sincere thanks to ***Dr. S.M. Rehman, Dr. Rajesh Kumar, Dr. Ramdatt Mishra and Dr. A.K. Jaiswal*** *for being a constant source of encouragement and lighthouse in this hard journey.*

I pay tributes to all my teachers both past and present who taught me all I know and made me what I am today.

The immense love and patience of my family have been instrumental for me to achieve anything in life, not to mention this milestone alone. But for their care and concern, I have been undone. Mere words cannot express my profound indebted to my beloved parents ***Sri. Manoj Kumar Sinha*** *and* ***Smt. Suman Sinha,*** *and the constant encouragement of my sister* ***Prerna Sinha*** *and my brother* ***Harsh Sinha****, have kept me in good spirits throughout my study period, I owe everything to them*

I also wish to place on record my profound thanks for my batch mates ***Prasanna, Lakshmi, Mehar*** *and* ***Shireesha,*** *Ph.D Scholars* ***Ramkrishna, Naipunya, Divya & Krishna Teja*** *and my juniors* ***Areef, Vasu*** *&* ***Vishnu*** *for their unconditional help.*

The thesis must surely bear the imprint of the love showed upon me by my friends ***Sindhu, Shikta, Priya, Mubeena, Vinayvathi, Akhila, Prayasi, Maitri, Tamannah, Pooja, Uma, Raju, Mahita, Siddharth*** *and my seniors* ***Merlin, Shruthi , Zuby, Mallika*** *and* ***Lohith*** *for being close to me and who together made my life in the campus a memory to be cherished later.*

My sincere thanks to the ***farmers of Ranchi district*** *of Jharkhand for their co-operation and producing the primary data for the study.*

My gratitude to ***Indian Council of Agricultural Research*** *for providing financial help in the form of stipend to pursue my Post Graduation and research.*

Lastly, I would like to take this opportunity to thank all my friends, cousins, relatives, well- wishers and others for their kind cooperation and well wishes.

Tirupati

June, 2017 *Manjisha Sinha*

LIST OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

LIST OF SYMBOLS AND ABBREVIATIONS

%	:	per cent
₹	:	Rupee
BEO	:	Break Even Output
et al.	:	and others
etc.	:	and so on
Fig.	:	Figure
i.e	:	that is
R & D	:	Research and Development
Viz.,	:	namely

ABSTRACT

Author of the thesis	:	**MANJISHA SINHA**
Title of the thesis	:	**ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF LAC IN RANCHI DISTRICT OF JHARKHAND STATE**
Degree to which submitted	:	**Master of Science in Agriculture**
Faculty	:	**Agriculture**
Discipline	:	**Agricultural Economics**
Major Advisor	:	**Dr. N. VANI**
University	:	**Acharya N. G. Ranga Agricultural University**
Year of submission	:	**2017**

The present study entitled **"Economic Analysis of Production and Marketing of Lac in Ranchi District of Jharkhand State"** was undertaken to study the input use patterns, cost and returns of production of lac, marketing channels for marketing of lac and processing aspects of lac and constraints in production as well as marketing of lac.

The study covered 3 blocks and 6 villages with 90 farmers culturing lac. Based on the number of lac host trees owned by the household, the data were categorized into small (0 – 33 trees), medium (34 – 46 trees), large (47 – 59 trees) and very large (60 – 216 trees). The data pertained to agricultural year 2015-16 were collected through survey method with the help of pretested schedules. Conventional analysis was used to analyse the data and to arrive at valid conclusions.

The cost of cultivation of lac on small, medium, large, very large and pooled was estimated at ₹ 20807.36 for 14 host trees, ₹ 25185.37 for 20 trees, ₹ 29542.46 for 27 host trees ₹ 39676.24 for 50 host trees and ₹ 28323.03 for 26 host trees respectively and thus exhibiting direct relationship with the size of the farm.

The net income obtained from lac production varied from ₹ 9025.51 per 14 host trees in small farms, ₹ 25213.34 per 20 host trees in medium farms, ₹ 44370.86 per 27 host trees in large farms, to ₹ 103430.47 in very large farms with overall average of ₹ 41952.10 on pooled farms. Thus, net income has positive relationship with the size of the farms.

In the marketing of lac only one channel were identified. They were, producer ➤ village merchant (Paikar) ➤ town merchant (wholesaler) ➤ Processor. The analysis of marketing costs and margins revealed that the producer was getting a share of consumer's rupee of about 81.76 per cent.

The total cost incurred to produce one tonne of seedlac was ₹ 142339.79 consisting of variable cost amounting to ₹ 139010.90, fixed cost ₹ 287.73 and marketing cost of ₹ 3041.10 sharing about 97.66 per cent, 0.20 per cent and 2.14 per cent respectively.

The gross return obtained from the lac processing unit amounted to ₹ 146356.16 and the net return obtained from the lac processing unit were ₹ 4016.37.

Chapter ~ I

Introduction

Chapter I

INTRODUCTION

The issues of forest people and potential of non-wood forest products are often forgotten while addressing rural development. It is well recognized that forest-people are poor, vulnerable and insecure. Considering their position at risk irrespective of geographical boundaries World Bank has rightly endorsed a new forest policy and strategy (2002). The chief objective of that policy aimed at improving the livelihood of about 500 million people living in extreme poverty, who depend on forests. The revised forest strategy covers all forest types and has been built on three interdependent pillars, that are - protecting vital local and global environmental services, value provided by forests, harnessing the potential of forests to reduce poverty and integrating forests in sustainable economic development.

The harnessing, fortifying and tapping of forest resources, particularly Non Wood Forest Products (NWFPS) like natural resins, gums and exudates, leaves (tendu), turpentine from pines, and perfumery oils from roots, stumps and fruits of various tree species helps in fighting against poverty for enhancing the livelihood of forest dwellers. Indian subcontinent is the major hub of biodiversity of flora and fauna. The forests in India, once known for their valuable timbers, are now looked at for their Non Wood Forest Products (NWFPs) with a clear shift in the paradigm (Omkar *et al.*, 2012). Forest resources have been identified as one of key sources for livelihoods and food security of tribal households (Dovie, 2003). Several forest produces have significant importance in social and economic life of tropical lands as about 1.73 lakh villages located in or around forests and for 275 million people, forests constitutes important sources of income.

Non Wood Forest Products (NWFPs) provide about 40 per cent of total official forest revenues and 55 per cent of forest-based employment in India and thereby act as a critical component for sustenance (Tewari and Campbell, 1995).

Lac happens to be one of the important non wood forest products of India. The tiny lac insect "*Kerria lacca*" (Kerr) has become a part of the civilization by providing livelihood to a large number of poor tribal people. For the year of 2014 - 2015, the total export of lac and its value added product India was 6569.17 tonnes which was worth of Rs. 322.50 crore. India is traditionally the largest producer of lac, guar, psyllium and karaya gum.

As observed by Watt (1908) "Lac enters into the agricultural, commercial, artistic, manufacturing, domestic and sacred feelings and enterprises of the people of India to an extent hardly appreciated by the ordinary observers".

Lac has been known in India from time immemorial. The term "Lac" seems to have been derived from the Sanskrit word "Laksha" meaning a hundred thousand and is suggestive of the large number of insects involved in its production. The description of the insect and its host plant (Food plant) – Palas (*Butea monosperma*) is recorded in the *Atharva Veda*. Lac is also mentioned in the Mahabhartha in the form of "laksha griha". The Ain-i-Akbari of 16^{th} Century records the use of pigmented lac varnishes for painting screens. The use of lac was known to ancient Greek and Romans also. The increasing demand of lac products after World War-II has received attention in the past century. In order to increase the production of lac by scientific methods, an association named Indian Lac Association (I.L.A) was formed in 1921, Lac Research Institute (L.R.I) was established at Namkum, Ranchi in 1924, with a view to have greater participation of the

Government. In 1930, the Indian Lac Cess Committee (I.L.C.C.) was formed and the committee took over the Indian Lac Research Institute (ILRI) in 1957.

Lac is used in manufacture of glazed paper, printing and water proofing inks, lac bangles, dry mounting tissue paper, dental plates and optical frames. It is also used as a coat for metal ware to prevent tarnishing and for finishing various products such as playing cards, oil cloth and linoleum and for preserving archaeological and zoological specimen.

In electrical industry, lac is used as coating of insulator, coating of spark plugs, cement of sockets of electrical lamp, ant tracking insulating etc. In Pharmaceutical industry, lac is used in coating of tablets, micro-encapsulation of vitamins and coating of medicines. Lac dye is used in dying of wool and silk, soft drink formulation, pill coating, confectionary and chocolate coating. Lac wax has wide variety of uses in manufacturing shoe polishes, tailor's chalk, lipstick, crayons (for writing in glass). Now-a-days it is also used in fruit coating. Shellac is one of the oldest thermoplastic resins known. The fusibility and the property of accurate seal reproduction of sealing waxes were known in Europe during the middle Ages.

Lac cultivation is labour intensive (Lakra, 2012). It is a highly remunerative crop, paying high economic returns to the farmers and also foreign exchange to the country through its export. There is increasing demand from the world for the value added products of lac ranging from handicrafts to perfumes and bio-active compounds.

India, Thailand and China are major lac - producing countries in the world. About 70 to 80 per cent of the total world production is contributed by India. The important lac producing states in India are Jharkhand, Chhattisgarh, West Bengal and Madhya Pradesh. Jharkhand state ranks 1st

followed by Chhattisgarh, Madhya Pradesh, Maharashtra and Odisha. These five states contribute around 93 per cent of the national lac production. Contribution of Jharkhand in national lac production was 50.83 per cent, followed by Chhattisgarh (14.58 per cent) Madhya Pradesh (14.41 %), and Maharashtra (8.98 %) and Odisha (4.21 %).

Statement of the Problem

The Jharkhand state is bestowed with rich natural resources, abundant biodiversity and excellent human resources. Forests in Jharkhand extend over 23897.31 km^2 (29. 61%) of the total state's geographical area, having very rich floral and faunal biodiversity and hence, it is called the "the land of forest". The tribal people are an integral component of forests having inseparable symbiotic and mutually reinforcing relationship and emotional attachment (Singh and Quli, 2011). Of the 49 per cent rural poor, 75 per cent live either inside or on the periphery of the forests in Jharkhand (Anonymous, 2010). The inhabitants are forced either to migrate in search of work or survive on meager local resources that are very scarce. The forest resources play an important role in the livelihood support of these tribal people in terms of subsistence, income and employment generation. The forest resources are the second important contributor to the total livelihood income streams of the tribal communities of Jharkhand (Islam *et al.*, 2013). Therefore, the optimum utilization of resources available with the local population will help in reducing their pain of poverty. Besides, according to studies conducted in different villages in Jharkhand revealed that income generated from lac production is next to the paddy cultivation and the income from lac constitutes about 24 per cent of total agricultural income of the farmer (Pal *et al.*, 2009). In this context, it is felt necessary to conduct a micro level study and examine the economic aspects of production, marketing and processing of lac. Ranchi is the highest contributor of lac (2530 tonnes) followed by Simdega (1910 tonnes), Khunti

(1380 tonnes), Gumla (1330 tonnes) and for this reason the area of my research was Ranchi district of Jharkhand.

1.1 OBJECTIVES

1. To study the cost and returns structure in production of lac.
2. To study the marketing aspects of lac
3. To compute the cost and returns of processing of lac.
4. To study the constraints faced by lac farmers and marketing agencies

1.2 SCOPE OF THE STUDY

The results of the study provides information on cost and returns from lac production which would be useful to the producers, researchers and policy makers to take suitable measures to improve the production of lac. The study of price spread and the role of middleman would be greater relevance to the policy makers in fixing the remunerative price and to remove the bottlenecks in the marketing of lac and study of processing of lac will help to minimize the cost and increase profits of lac based industry.

1.3 LIMITATIONS OF THE STUDY

The study has been conducted over a limited period of time, in a limited area of particular agro-climatic and socio economic situation and hence suffers from draw backs. The conclusions drawn are applicable to that area and areas with similar conditions. The necessary primary data regarding the production of lac were collected from the farmers based on their recall memory by using survey method and hence has inherent limitations.

1.4 PLAN OF THE THESIS

The thesis is presented in five chapters. The first chapter deals with the introduction, highlighting the importance of lac production along with

the objectives, scope and limitations of the study. The second chapter is devoted to review the past research work done. The third deals with the sampling procedure, method of collecting data and analytical tools employed. The fourth chapter encompass on critical analysis of results and discussion. The final chapter presents the summary and conclusions of the study.

Chapter ~ II

Review of Literature

Chapter–II

REVIEW OF LITERATURE

This chapter presents a review of the past studies undertaken by various economists, research workers, and organizations relating to the current research topic for enhancing better understanding of the study. A review of past research helps in identifying the conceptual and methodological issues relevant to the study. This will enable the researcher to identify the gaps, collect relevant data and subject them to sound reasoning and meaningful interpretation. Keeping in view the available literature has been carefully examined and meticulously summarized and have been presented under the following heads for the sake of simplicity.

2.1 Studies on costs and returns of lac production

2.2 Studies on marketing of lac and lac based products

2.3 Studies on processing pattern of lac

2.4 Studies on problems and constraints faced by the lac farmers and marketing agencies.

2.1 STUDIES ON COSTS AND RETURNS OF LAC PRODUCTION

Jaiswal *et al*. (2006) in their study on importance of lac in the socio economic life of tribals in Ranchi district (Jharkhand) found that maximum income per annum is generated from paddy crop (Rs. 11,347) followed by lac (Rs. 7,289), wheat (Rs. 2,489), vegetable (Rs. 1,605) and black gram (Rs. 726). The percentage share of income from these crops was 43.9 per cent, 28.2 per cent, 9.6 per cent, 6.2 per cent and 2.8 per cent respectively. They showed that income from lac exceeds Rs. 10,000 per family per annum in Kantadih and Kocho village of Ranchi district while in Modidih and Sundil villages the average income per family per annum was Rs. 3,500 and Rs. 3,800 respectively.

Sharma *et al*. (2006) studied about the role of lac culture in biodiversity conservation: issues at stake and conservation strategy estimated that average net profit from one tree is Rs. 109 for palas, Rs. 202 to Rs. 1,060 for ber and Rs. 1,320 for kusum per crop cycle. Therefore lac provides sustained high economic returns, generates employment opportunities as about one million man days are generated in existing lac processing factories.

Pal (2009a) in his study about the impact of scientific lac cultivation training on lac economy; a study in Jharkhand reported that the share of lac income in total income was 24.4 per cent. In case of untrained farmers the net returns from lac cultivation on palas tree and ber tree was Rs. 4, 886 and Rs. 9,771 while in case of trained farmers it was Rs. 8,169 and Rs. 20, 914.

Pal (2009b) in his study on resource use efficiency and level of technology adoption in lac cultivation among trained and untrained lac growers in Jharkhand, found that net returns in lac cultivation for 10 host trees by untrained lac growers was Rs. 977, Rs. 1,954 and Rs. 16,281 for palas, ber and kusum, respectively while it was Rs. 1,634, Rs. 4,183 and Rs. 33,129 for 10 host trees by trained lac growers for palas, ber and kusum, respectively.

Pal (2009c) in his study on socio - economic characteristics of lac growers in Kanker district of Chhattisgarh showed that contribution of lac in total income and farm income was 18.5 per cent and 26.4 per cent respectively, for untrained while 24 per cent and 32 per cent in trained lac growers. The cost of cultivation and net returns per host on palas (*Butea Monosperma*) worked out to Rs. 51.30 and Rs. 97.70 respectively for untrained and trained lac growers. Cost of cultivation and net returns per host on ber (*Zizyphus mauritiana*) worked out to Rs. 93.50 and Rs. 195.40 respectively for untrained and Rs. 159.20 and Rs. 418.30 respectively for

trained lac growers. Cost of cultivation and net returns per host in kusum (*Schleichera Oleosa*) worked out to be Rs. 688.10 and Rs. 1,628.40 respectively for untrained and Rs. 1,104.20 and Rs. 3,312.90 respectively for trained lac growers. Due to low investment in fixed cost, break even production was very low in comparison to the existing production lac growers. Low break even prices show that risk in lac cultivation is very low and it will be profitable enterprise even in low prices. Risk bearing ability was more in case of lac growers.

Pal *et al.* (2009) studied about lac cultivation as a risk-coping strategy for agriculture in Jharkhand and analyzed that contribution of lac in total income and farm income was 24.0 per cent and 32.0 per cent. Cost of cultivation and net returns per host on palas (*Butea monosperma*) and ber (*Zizyphus mauritiana*) worked out to Rs. 70.70, Rs. 163.40 and Rs. 159.20, Rs. 418.30 respectively.

Srivastava (2011) in his study of lac host plant – current status and distribution found that approximately 4 kilogram of broodlac are needed for inoculation on an average per kusum tree, 1.5 kilogram broodlac for inoculation on an average per ber tree and 750 gram to 1 kilogram of broodlac are needed for inoculation on an average per palas tree.

Kumar and Das (2012) in their study on new technology and chances of lac culture found that the net profit per tree was Rs. 3,602.91 and Rs. 2,488.40 in case of *kusumi* lac, and Rs. 1,518.37 and Rs. 1,041.08 in case of *rangeeni* lac.

Lakra (2012) in his study of livelihood and forest conservation (with special references to lac cultivation in Chattisgarh) estimated that the lac growers are getting an income of Rs. 1000, Rs. 76000 and Rs. 8240 per annum from each of the host trees of palas, ber and kusum respectively.

Bhatia *et al*. (2013) in their study on forest insect industry in collaborative forest management: an overview found that mean lac productivity varies from 1-10 kg per tree depending on the host tree species and climatic conditions. Average net profit from one *Butea monosperma* tree is Rs. 109, in case of *Zizyphus mauritiana* the net profit was Rs. 202 to Rs. 1,060. In case of *Schleichera oleosa* per crop cycle net profit was Rs. 1,320.

Pal. (2013) in their study of lac production and processing in Chhattisgarh status and prospective, they, reported that 6.70 per cent of the lac growers have total income less than Rs. 12,000, 68.30 per cent have total income between Rs. 12,001 to Rs. 20,000, 18.3 per cent have total income between Rs. 20,001 to Rs. 30,000 and only 6.7 per cent farmers have total annual income more than Rs. 30,000.

Paul *et al.* (2013) in their study on lac cultivation and their host trees found in Bastar forest division found that beneficial insects are one of the important economic components of forest ecosystem. The average annual income from lac was around Rs. 7,000 per family.

Mandal *et al*. (2014) in their study on cost of lac cultivation and its profitability in Purulia district of West Bengal revealed that total cost of production of *rangeeni* and *kusumi* lac crop incurred by all farm size groups was Rs. 20,52,005.40 and Rs. 11,14,332.50 while the total net returns earned by all farm size groups from *rangeeni* and *kusumi* lac crop was Rs. 22, 75,194 and Rs. 9, 35,267.80 respectively.

Mohammad *et al*. (2015b) in their study on analysis of production and marketing of palas tree in Korba district of Chhattisgarh found that the cost of cultivation for palas was worked out as Rs. 2,419.08 per tree. Major expenditure was incurred on broodlac (91.46 per cent) followed by inoculation of broodlac (1.90 per cent). The average production per tree of lac for palas was observed as 22.13 Kilogram, average input-output ratio of lac was observed as 1:2.29 for palas tree.

Shah *et al.* (2015b) in their study on comparative study of production cost and net returns in rice and lac cultivation found that lac production has a comparative economical advantage over rice production in terms of profits as the cost of cultivation of rice under manual and mechanized production system was Rs. 42,172 and Rs. 17,375 per hectare while the returns were Rs. 19,028 and Rs. 43,825 respectively. The total cost of cultivation for the *rangeeni* and the *kusumi* were Rs. 18,040 per 50 *Zizyphus mauritiana* trees and Rs. 11,790 per 50 *Butea monosperma* trees and net returns were Rs. 58,460 and Rs. 32,285 respectively.

Singh *et al.* (2015) in the study on maximization of profitability through lac production on *Flaminga semilata* (a bushy lac host) estimated that lac cultivation resulted in higher net income of Rs. 3,23,929 compared to Rs. 16,980, Rs. 26,910 and Rs. 43,980 under rice, wheat and rice – wheat cropping system respectively. The net benefit – cost ratio of lac cultivation was 1.30 and that of rice, wheat and rice-wheat cropping system was 0.35, 0.8 and 0.54 respectively.

Sridhar *et al*.(2015) in their study on a tree with a purpose: *Butea monosperma* (Lam.) (Improving livelihood of disadvantaged rural people of central India) reported that on an average a managed single palas tree of 80 cm girth and 13 m height can produce around 5.4 kg of stick lac as against 1.8 kg of broodlac inoculated. Hence a single well managed mature tree fetch 48 USD/yr/farmer.

Chavan *et al.* (2016) in their study on trees of life: creating sustainable livelihood in Bundelkhand region of central India found that a single tree of palas can produce 1.5 – 2.5 kg of lac with annual income of Rs. 700 – 800 per tree. The palas - based agro forestry systems in Bundelkhand region can generate an income of Rs. 1200 – Rs.1500 per tree.

Dwivedi *et al.* (2016) in their study on socio - economic profile of lac growers in Bastar district of Chhattisgarh indicated that 68.75 per cent of the respondents were involved in lac production along with the cultivation of the major crops. The annual income of the 60 per cent of the lac growers belongs to Rs. 20,000 to Rs. 40,000 per year.

2.2 STUDIES ON MARKETING OF LAC AND LAC BASED PRODUCTS

Surayya (2000) in her study about the dependence of forest dwellers on fuel wood and non- wood products for their survival and pertinent marketing issues reported that mean annual income generated by forest dwellers from NTFPs collection and sale was Rs. 2,337, mean income from collection and sale of firewood and livestock sale are accounted to be Rs. 2,500, whereas income from agricultural source and borrowing from others was highest about Rs. 4,846 and Rs. 3,388 respectively.

Naidu *et al*. (2003) conducted a study on temporal variations in the marketing of minor forest produce in tribal areas of Andhra Pradesh- A case study. The number of tribals in the country accounted approximately seven per cent of the total population. As the tribal agriculture is mostly on primitive lines and with meager irrigation sources, it is inevitable for the tribal farmers/laborers to draw their subsistence largely from the forests by collecting and marketing of minor forest produce (MFP). As most of the lendings to the tribal farmers are given by GCC at a very low rate of interest when compared to the local village traders, the transactions through GCC were greatly increased.

Alibaba and Rao (2005) in their study on marketing of minor forest produce in Adilabad district of Andhra Pradesh reported that, there are two channels for marketing for minor forest produce,

Channel one: Tribal seller → Village trader → Wholesaler → Retailer → Consumer

Channel two: Tribal seller → Girijan Co-operative Corporation → Consumer.

They stated that, the tribals were exploited by offering low price when they sold to village traders and hence, loans should be provided through GCC to minor forest produce collections to prevent distress sale to village traders.

Sahu *et al*. (2007) made an attempt to give a brief account of the trend and growth rates of production and revenue of minor forest products in Madhya Pradesh. The growth rate value of revenue from minor forest products was found positive but non-significant, which indicates that there is a scope to increase the revenue by increasing production. Thus it is concluded that the total forest area and revenue increased. But the productions of minor forest products have tended to decline over the study period, whereas total revenue increased with different magnitudes.

Sinha *et al.* (2007) studied about the exploitation of tribes in factor and product markets in Tripura. In this study an attempt was made to assess how far and to what extent the tribes in Tripura were exploited in the factor and product markets in comparison to their non-tribal counterparts. The study revealed that there was discrepancy in the wage rate paid to the tribal and non-tribal laborers in the different goan sabhas and the inability of the tribal sellers in realizing better market price

Pal *et al.* (2009) in their study on an analysis of price spread in marketing of lac in Madhya Pradesh found that price received by lac growers was Rs. 66 per kilogram in marketing of lac, constituting about 77 per cent of consumer's price. The primary purchaser gained a net margin of Rs. 212 per quintal by selling the produce to the wholesaler after incurring a

cost of Rs. 88 per quintal. The wholesaler in turn to sell the produce to lac manufacturers incurred a marketing cost of Rs. 1,506 per quintal which constitutes 17.55 per cent of consumer's price. The wholesaler earns net margin of Rs. 174 per quintal.

Alex *et al*. (2016) in their study on the marketing of non – timber forest products in the Western ghats region of Attappady, Kerala found that there are different marketing channels for different edible, industrial and medicinal purpose non timber forest products:

For edible product

Channel 1: Primary collector ⟶ Kurumba society ⟶ Consumer.

Channel 2: Primary collector ⟶ Private shops ⟶ Consumer.

Channel 3: Primary collector ⟶ EDC ⟶ Consumer.

Industrial products

Channel 1: Primary collector ⟶ Kurumba society ⟶ Federation ⟶ Industries.

Channel 2: Primary collector ⟶ Private shops ⟶ Industries/ shops.

Channel 3: Primary collector ⟶ EDC ⟶ Consumer.

Medicinal plants

Channel 1: Primary collector ⟶ Kurumba society ⟶ Pharmaceutical company.

Channel 2: Primary collector ⟶ Private traders ⟶ Medicinal shops.

Among the 23 NTFP's, 9 were exclusively marketed through the society and one product exclusively through the private shops, 10 products through society and private shops, one product marketed through the Eco Development Committee(EDC) and private shops and 2 products through all the 3 channels.

Pal *et al.* (2013) in their study on an economic analysis of lac marketing in Kanker district of Chhattisgarh found that the lac grower received Rs. 75 per kilogram. The primary purchaser's margin was Rs. 260 per quintal and incurred Rs. 63 per quintal on marketing cost. The marketing margin was Rs. 140 per quintal.

Sircar *et al.* (2013) in their study on lac cultivation in India, lac prices at grower's level revealed that total production varies from a high of 15,430 metric tonnes during 2003-04 to low of 6,942 metric tonnes during 2008-09 with a mean of 10,908.29 metric tonnes and co-efficient of variation of 27.44 per cent. The net realized price at international market varies from Rs. 167.6 per kg during 2007-08 to Rs. 222.43 per kg during 2006-07 with a mean price of Rs. 190.92 per kg and co-efficient of variation 12.28 indicating narrow fluctuation in international market.

Sharma *et al*. (2014) in their study on supply chain of guar products in India: challenges and options found that the issues related to marketing and supply chain of guar seed and products includes lack of containers and transport facilities for processed products from processing point to the port of export, lack of storage facilities, poor linkage of buyers to farmers *etc*.

Pal (2014) in his study of marketing scenario of lac in India found that that there were seven marketing channels for the marketing of Lac that are

Channel 1: Lac arhat → Lac manufacturer → Consumption in the country.

Channel 2: Lac arhat → Lac manufacturer → Export by lac exporter.

Channel 3: Lac arhat → Wholesaler → Lac manufacturer→ Consumption in the country.

Channel 4: Lac arhat → Paikar → Wholesaler → Lac manufacturer → Consumption in the country.

Channel 5: Lac arhat → Paikar → Lac manufacturer Consumption in the country.

Channel 6: Lac arhat → Lac producer → LAMPS/PACS/VMSS → Jascolampf (in Jharkhand) → Consumption in the country.

Channel 7: Lac arhat → Lac producer → LAMPS/PACS/VMSS→ Jascolampf (in Jharkhand) → Export by lac exporter.

Ramani *et al*. (2014) in their study on supply chain management in lac reported the following five channels in lac marketing. These are

a) Lac growers → Paikar → Wholesaler → Lac arhtia → Lac processor → Domestic consumption.

b) Lac growers → Paikar → Lac processor → Export

c) Lac growers → Lac processor → Export.

d) Lac growers → LAMPS/PACS/VMSS → Domestic consumption.

e) Lac growers → LAMPS/PACS/VMSS → export.

Shukla *et al*. (2015b) in their study on performance measurement of marketing of forest produce in Chhattisgarh state found that the marketing channels for lac in Chhattisgarh state:

Villagers → Petty traders → Main traders → Processors

Yogi *et al*. (2015) in their study on socio- economic silhouette and value chain analysis: an overview of lac sector found that the marketing channels involved in lac marketing involves following channels-

Lac growers → Paikar → Wholesaler → Lac arhatia → Lac processor → Export.

Lac grower → Paikar → Wholesaler → Lac processor → Domestic consumption.

Import → Lac processor → Domestic consumption.

Lac growers → Lac processor → Export.

Lac growers → LAMPS / PACS / VMSS → Domestic consumption.

Lac growers → LAMPS / PACS / VMSS → Export.

Mohammad *et al*. (2015b) in their study on economic analysis of production and marketing of palas tree in korba district of chattisgarh found that there were three marketing channels for the marketing of Lac that is

Channel I: Producer → Wholesaler → Retailer → Primary processor.

Channel II: Producer → Wholesaler → Primary processor

Channel III: Producer → Primary processor.

It was observed that 54.50 per cent of produce has been marketed in I, II, and III respectively.

2.3 STUDIES ON PROCESSING PATTERN OF LAC

Raikar (1990) in his study on investment in production and marketing of cashew in Karnataka observed that the utilization of installed capacity depends on the volume of cashew nuts procured. The per quintal total cost of processing worked out to be Rs. 553.54. Interest on capital was the major component in the total cost of processing of cashew nuts, constituting 53.62 per cent of the total cost followed by wages for piece rate workers (20.36 per cent) and the cost of tins (11.71 per cent). The cost of production of kernels worked out to Rs. 1,976.55 per quintal of raw nuts processed. It was found that raw material cost alone formed 72 per cent of the total cost, remaining cost was shared by processing cost which constituted 28 per cent.

Handiganur (1994) worked out the cost of preparing the raisin by different methods such as sulphur fumigation method, dipping oil method and hot dipping method. The per hectare cost of chemicals incurred in preparation of raisin was Rs. 10,779.99 in sulphur fumigation method of which ethyl oleate shared maximum of 60.64 per cent followed by potassium carbonate (32.70 per cent). The total cost of production in dipping oil method was Rs. 19,559.17 was used in production of raisin of which, dipping oil accounted for maximum share of 88.35 per cent followed by potassium carbonate (11.37 per cent). The total cost of production of raisin in hot dipping method was Rs. 2,189.65 of which, fuel cost was the maximum (56.40 per cent) followed by ethyl oleate (34.29 per cent), sulphur (7.05 per cent) and sodium hydroxide (2.26 per cent).

Shivaraya (1997) in his study on production, marketing and processing of red gram in Gulbarga district of Karnataka: An economic analysis estimated that total cost incurred on per quintal of red gram

processing was Rs. 2169.05 and per quintal of output (dal) it was Rs 2711.31. Out of the total cost, variable cost formed more than 98.20 per cent. The net returns per quintal of red gram processed were higher in large size dal mills (Rs. 112.34) as compared to small size dal mills (Rs. 90.16).

Joshi *et al.* (1999) estimated the cost of processing of mango pulp and the profitability of the business in South Konkan region estimated that input-output ratio was 1/1.1, 1/1.16, 1/1.13, and 1/ 1.39 for home scale, cottage scale, small scale and large scale of processing, respectively.

Jayalakshmy and Abdul Salam (2002) in their study on cost of establishment of a cashew apple processing unit and production cost of cashew apple syrup reported that the cost of establishment of processing unit was approximately Rs. 43,300. This excludes land and building cost. The cost involved (the labour and inputs) for processing one tonne of cashew apple was Rs. 1940. A minimum of 750 bottles of cashew apple syrup can be obtained from one tonne of cashew apple. This worked out to a cost of Rs. 25.80 per bottle. Of the total cost, 85 per cent makes the input cost (chemicals, bottles, sugar etc.) and 15 per cent to the labour cost.

Wadkar and Patil (2002) from their study on economic analysis of processing and export of cashew reported that the average aggregate capital invested per processing unit was Rs. 90 lakh in which contribution of working capital was 88 per cent and fixed capital was 12 per cent of the working capital. More than 90 per cent was incurred on procurement of cashew nut. One quintal of cashew nut when processed resulted in 24.70 kg of kernel. The gross value added due to cashew processing was 40.56 per cent and Cost-Benefit ratio was 1.19.

Gupta and Prasanth (2004) in their study on marketing and processing of cashew nut in Goa State, an economic analysis revealed that the total marketing and processing cost was estimated as Rs. 1,031.22 per quintal and Rs. 973.69 per quintal at small and large plants respectively. The total

marketing cost was observed as Rs. 73.11 and Rs. 76.82 per quintal at these two sizes of plants which is 7.09 per cent of the total cost. The mandi tax was the important cost component which constitutes about 45 per cent of total marketing cost. The total processing cost was divided into variable cost and fixed cost. The wages and salaries were the most important cost component of the variable cost on which processing units were spending more than 75 per cent of the total variable cost. The total variable cost at small and large plants was computed as Rs. 322.78 and Rs. 287.94 per quintal respectively. Second important cost item was the packaging which about Rs. 40 to Rs. 44 per quintal was spent by the processors.

Wadkar *et al*. (2005) studied about Comparative economics of large scale and house hold level cashew processing units reported that the cost of processing was the most important factor on which the success (or) the failure of the unit depends. More the cost of processing, lesser is the profit margin to the unit and vice versa. The cost of processing per quintal of cashewnut was Rs. 1040.80 in large scale cashew processing unit (LSCPU), and Rs. 1175.61 in household level cashew nut processing unit (HSCPU). The per quintal cost of processing exhibited inverse relationship with the scale of production. This revealed that processing was costly for the units of HSCPU capacities. The major cost was on interest on working capital and fixed capital.

Sukanya (2006) in her study on economic analysis of production and marketing of vanilla in Karnataka worked out the total processing cost of vanilla bean at Rs. 6.61 per kg. Out of total processing cost, the cost on labour charges was Rs. 4.68 (70.80 per cent) constitute the major share in total processing cost followed by amortized establishment cost Rs. 1.82 (27.53 per cent) and fuel charges Rs. 0.06 (0.90 per cent). The farmers obtained a net profit of Rs. 43.39 per kg of cured vanilla bean over the

unprocessed green vanilla bean. The recovery percentage was reported as 20 per cent on an average.

Sachin and Kumar (2008) in their study on economics of jaggery production in Karnataka revealed that the cost of establishing jaggery processing unit with a capacity of one tonne per day was Rs. 2,68,347. The total cost of jaggery production, including marketing cost was Rs.14.57 lakh per year of which, the raw material cost accounted for 72.97 per cent. The returns from jaggery processing unit per year was Rs. 16.19 lakhs with a net margin of Rs.1,61,715 for producing 140 tonnes of jaggery, with 27 tonnes as to reach breakeven out-put. The average cost of producing one tonne of jaggery including marketing cost was Rs. 10,449 with net returns of about Rs. 1,160. Positive NPV and very high IRR indicated the economic viability of jaggery processing units in the study area.

Santosh (2008) in his study on an economic analysis of production and processing of red gram in Gulbarga district of Karnataka observed a direct relationship between total capital employed and size of the dal mills. The total cost incurred for red gram processing was Rs. 2,547 per quintal. Out of the total cost, variable costs formed more than 98 per cent. The net returns per quintal of red gram processed were higher in large size dal mills (Rs. 115.27) compared to small size dal mills (Rs. 111.91). Business ratio analysis showed that the large size dal mills were more efficient and there by earned more profit, compared to small size dal mills. The break-even output in large size dal mills was 3,457.22 quintals as against 2,103.51 quintals in small size dal mills.

Banerjee *et al.* (2014) in their study on economic analysis of cashew nut processing in India found that the total annual cost of the various resources used for 100 kilogram capacity cashew processing plant was Rs. 32,64,932 and that of total annual return was Rs. 35,97,200. Therefore, annual profit was Rs. 3,32,268 and Rs. 1329.07 per day profit.

Sharma (2014) in their study on supply chain of guar products in India: challenges and options found that the major challenges in guar processing include the poor research and development in the country for processing technology, lack of certification laboratories in the processing centres, policies promoting export of intermediate product, competition from strong opponent countries.

Shukla and Pandey (2015a) in their study on a study of marketing and processing of forest produce in Chhattisgarh state found that the processing centre's were near to the places where production happens. For instance in Kanker and Bastar district of Chhattisgarh state arrive at the processing centres of Dhamtari. Most of the processing centres were involved with the first level of conversion *i.e* stick lac to seed lac.

Nag *et al*. (2016) in their study on an economic analysis of cashew nut processing in Bastar district of Chhattisgarh state found that the cost of cashew nut was found Rs. 9,500 per quintal and processing cost was Rs. 1,500 per quintal. The net income of cashew nut was Rs. 9,100 per quintal and input – output ratio was 1:1.83. The recovery per cent was found 22 per cent of the fresh fruit.

2.4 STUDIES ON PROBLEMS AND CONSTRAINTS FACED BY THE LAC FARMERS AND MARKETING AGENCIES.

Jaiswal *et al*.(2001) in their study on practices of lac cultivation by farmers on non conventional lac host trees opined that due to high temperature there is always a risk that lac insect culture will die on conventional lac host trees like *Butea monosperma, Zizyphus mauritiana* and *Schelichera oleosa* and thus creating a shortage of broodlac. This can be solved by using non conventional sources like ficus species which gives a yield of about 20-25 kilogram of broodlac and 8-12 kilogram of scrapped lac by inoculating 3.5 - 4 kilogram in trees.

Sharma *et al.* (2001) in their study on new record of fungi associates with Indian lac insect, *Kerria lacca* found that lac cultivation on palas (*Butea monosperma*) had always posed problem, particularly in host regions in summer; with hot dry wind spells. This can be up to 80-90 per cent of lac insect of baisakhi crop.

Jaiswal *et al.* (2003), in their study on problems of lac growers in Jharkhand state stated that five problems which scored more than 50 percent ratings are: mortality of lac crop during fog especially on *Ziziphus mauritiana* (Ber) and *Schleichera oleosa* (Kusum) (72 per cent), shortage of broodlac (62 per cent), non-remunerative market price of lac (57 per cent), spider net on host trees resulting into trapping of crawlers (53 per cent) and lack of technical knowledge on lac cultivation (52 per cent), crop mortality on *Butea monosperma* (palas) during rain after intense heat in summer (50 per cent) , dearth of capital for investment in lac cultivation (48 per cent), damage of lac encrustation by squirrel (43 per cent), lack of technical information on lac cultivation (42 per cent), theft in form of broodlac and mature lac sticks (41 per cent) and mortality of crop due to high temperature during summer on *Zizyphus mauritiana* and *Butea monosperma* (40 per cent). Other problems, which have rating between 31-40 per cent, are damage of lac crop by insect pest of lac (35 per cent), lack of information on market price of lac (33 per cent) and damage of lac crop during thunderstorm and peeling of bark of *Ziziphus mauritiana* shoot by rat (31 per cent).

Jaiswal *et al*. (2006) in their study on importance of lac in the socio economic life of tribals in Ranchi district (Jharkhand) reported that major hindrance for lac cultivation are wide fluctuation in prices, year to year and within the year and non-remunerative prices received by lac growers.

Sharma *et al*. (2006) studied about the role of lac culture in biodiversity conservation: issues at stake and conservation strategy found the constraints in re - initiation of lac. Those constraints were broodlac cannot be stored for more than a week, multiplication ratio in lac culture was low (1:3-7), *i.e* for every 1 kilogram of broodlac used only 3 to 7 kilogram were obtained, life cylcle of lac insect is long, it takes 4-8 months to complete one generation, no open market to lac growers and vulnerable to pest and disease.

Barman *et al*. (2007) in their study on effect of lac cultivation on yield of Jujube of different ber (*Zizyphus mauritiana*) of found that lac insect experiences both biotic and abiotic stress which reduces the yield of their host like *Zizyphus mauritiana* by 10.9 per cent to 25.3 per cent.

Pal (2009a) in his study on impact of scientific lac cultivation training on lac economy – a study in Jharkhand, found that the major hindrance faced by the lac growers were shortage of funds for purchasing the inputs in local and nearby markets, theft of lac, shortage of broodlac, insect death due to climatic changes, lack of information on current price of lac, lack of scientific knowledge on lac cultivation, difficulty in cultivation operation due to host height, long distance market and lack of grading facility in the market.

Pal *et al*. (2010) in estimation of lac production and processing in India found that main constraints in production were shortage of funds for purchase of inputs and high cost of broodlac, lack of scientific knowledge of cultivation, theft of lac, shortage of broodlac, insect mortality due to environmental factors and uncertainty in production, lack of season specific host and distance of host plant from home and scattered host plants. The main constraints of marketing are: lack of uniform policy regarding inter and intra state movement of produce, non- availability of improved inputs in local markets, lack of grading facility in the market, long distance of

market, lack of information on current price of lac, and no systematic channel for broodlac marketing. The main loopholes in processing of lac are: non- availability of skilled labourers especially during agricultural season, irregular supply of electricity and high electrical charges for mechanized inputs, price fluctuation of raw materials and finished products, difficulty in sanction of bank loans and lack of subsidy to lac manufacturers and adulteration in raw material and finished products.

Jaiswal *et al*. (2011) studied about the strategies for enhanced and sustained lac production – a viable option of economic security found that major constraints for lac production were a) shortage of broodlac b) lack of knowledge of scientific method of cultivation c) risk of lac insect mortality due to abnormally high temperature in summer d) lack of knowledge for availability of input like broodlac, pesticides, farm implements and equipments e) theft of standing lac crop.

Mishra (2011) in his study on technology of lac cultivation on palas found that lac cultivation on palas had always posed problems particularly in host regions in summer with hot dry wind spells which has caused mortality of 80 per cent to 90 per cent of the lac insects of Baisakhi crop.

Khorbragade *et al*. (2012) in their study on farmer participatory trial on the predator management of lac insect *Kerria lawwi(kerr)* in Anuppur district, Madhya Pradesh found that *Eublemma amabilis* was a serious predator of *kerria lacca* causing a yield loss upto 35.31 per cent.

Lakra (2012) in his study on livelihood and forest conservation (with special references to lac cultivation in Chhattisgarh) found the major constraints in lac marketing was lack of information on current prices to lac growers, lack of regulated market in lac, scattered lac growers, lack of infrastructure facilities like storage and support services in the market where lac is sold, indebtness of the farmers to traders, hence resorted to village sales.

Pal (2013) in his study on lac production and processing in Chhattisgarh status and prospects found that the major constraints in lac production in Chhattisgarh state were shortage of funds for purchase of inputs used in cultivation, scattered lac host plants and distant places from the home, theft of lac, uncertainty in lac production, problem in marketing of broodlac, problem in cultivation operation due to the host height, long distance of market for sale and lack of knowledge of current price of lac, and unavailability of improved inputs in nearest market.

Das *et al*. (2014) in their study on munda and their lac culture: a case study of Gulllu area of Murhu block in Khunti district found that 57 per cent of the farmers faced the problem of shortage of broodlac, 39 per cent faces the problem of lac insect death and about 4 per cent lac growers faced the problem of scattered host trees.

Yadav *et al*. (2014) in their study on an empirical appraisal of production, export potentialities and policy reform for lac cultivation in India found that the major constraints in lac production was non – availability of broodlac, dearth of cash money, adverse climatic conditions and lack of credit facilities.

Gupta *et al*. (2015) in their study on problems faced by tribes in collection and marketing of non timber forest products in Chhattisgarh, India found that the major problems faced by the respondents in collection and marketing of NTFPs was that 95.56 per cent of the respondents were facing the problem of low and fluctuated market prices of NTFPs followed by existence of bad weather and lack of developed market infrastructure for NTFPs (94.07 per cent), deforestation (82.96 per cent), over collection of NTFPs by outsiders (74.07 per cent), lack of transport facilities (48.89 per cent), processing and marketing of NTFPs (44.44 per cent), lack of subsidy (39.26 per cent), lack of availability of timely market information about NTFPs (33.33 per cent), lack of low cost storage facilities (25.93 per cent).

Shah *et al*. (2015a) in their study on lac production, constraints and management found that the lac production continues to be constrained by a variety of biotic factors like neuropteran predator like *Chrysoperla zastrowi Arabica*, *E. ambabilis*, *P.pulverea* and parasitoids like *Tachardia ephagus tacharadiae*, *Aprostocetus purpureus* and several abiotic factors like drought, salinity, heat, cold and nutritional stress.

Shukla *et al.* (2015b) in their study on performance and measurement of marketing of forest produce in Chhattisgarh state found that 87 per cent of the respondent cited the problem of lack of training in cultivating lac through modern methods followed by 76 per cent of the lac growers who didn't have the access to adequate broodlac for lac production and other growers faced the problem of death of broodlac due to extreme temperature(more than 42° c) and also theft of broodlac.

Mohammad *et al*. (2015a) in their study on constraints of production and marketing of lac in Korba district of Chhattisgarh found that the major constraints pertaining to cultivation of lac were problem of shortage of broodlac was reported as the hazardous problem by growers similarly, high temperature during summer season, intensity with continuous rainfall, and insect pest etc., lack of demonstration, lack of labour and regulated marketing system was reported as most important constraint faced by the farmers during marketing of Lac.

Dwivedi *et al*. (2016) in their study on socio - economic profile of lac growers in Bastar district of Chhattisgarh state found that 88.75 per cent of the respondents had taken credit from forest department, followed by 5.00 per cent respondents had taken credit from their friends, whereas 3.13 per cent of the respondents had taken credit from the neighbors and 3.12 per cent have taken credit from relatives respectively.

Chapter ~ III

Material and Methods

Chapter–III

MATERIAL AND METHODS

A micro level study was undertaken to analyze the economic aspects of production, marketing and processing of lac in Ranchi district of Jharkhand. This chapter presents the procedural details in selecting the sample, method of data collection and analytical techniques employed in attaining the objectives of the study. This chapter is presented under the following heads.

3.1 Area Description

3.2 Sampling Design

3.3 Collection of Data

3.4 Methods of Computation

3.5 Tools of Analysis

3.6 Concepts and Terms Used

3.1 AREA DESCRIPTION

3.1.1 Location

The study was undertaken in Ranchi district of Jharkhand state. Ranchi district is situated at the central north eastern plateau region of Jharkhand. It lies at the north latitudes 23°-35’ and the east longitudes 85°-23’.The district is sharing border with Khunti district to the south, Lohardaga district to the west, Ramgarh district to the north, Purulia district of West Bengal to the east. It has an area of 4962.82 sq. km and population of 2914253 persons. The district comprises two subdivisions namely Ranchi Sadar and Bundu and eighteen development blocks.

Fig .3. 1. District map of Ranchi.

3.1.2 Area

Ranchi district comprises of three taluks and eighteen development blocks. The total area of the districts is 4962.82 sq.km, consisting of 1311 revenue villages. Three blocks, Namkum, Angara and Bundu were selected for the study. The map of the district showing the study area is given below:

3.1.3 Population

The district has a total population of 2914253. As per 2011 census sex ratio is 949 per 1000 males. The density of population is 572 per sq.km. The decadal census shows an increasing tendency in the density of population. One important characteristic feature of this district is the large tribal population, consists of Munda, Oraon, Santhal and Kharia communities. SC and ST population constitutes about 5.25 and 36.74 per cent respectively to the total district population. The literacy rate of the district is 76.06 per cent and the male literacy is more than females. The total cultivators in the district are 317487 and agriculture labourers are 267360.

3.1.4 Climate and Rainfall

Ranchi has a humid sub-tropical climate, its location and the forests surrounding it combine to produce the unusually pleasant climate for which it was considered as the summer capital of Bihar during British raj. The district lies at an average elevation of 651 meters above the mean sea level. The mean annual temperature is 23.7°C. Summer temperature ranges from 20°C to 42° C; winter temperatures range from 0°C to 25°C.December and January are the coolest months, with temperatures dipping to frizzing point in some areas. The mean average rainfall in the district is 1430 mm. According to the Koppen Climate Classification the district falls in the subtype- “Cfa”. (Humid Subtropical Climate). The average temperature has increased throughout the year resulting into changing weather patterns.

3.1.5 Land Utilization Pattern

The geographical area of the district is 1230617.07 hectares and the same for the selected blocks Angara, Namkum and Bundu is 398 sq. Km, 415.61 sq. Km and 250.85 sq. Km respectively. Out of the total geographical area, the net sown area for the district during 2013-14 is 295965.31 hectares (24.05 per cent of the total area). Forest cover for the district accounts for an area of 238937.31 hectares. The other land utilization particulars for the year 2013-14 are also furnished in the Table 3.1.

3.1.6. Topography and Soils

The soils occurring in different land forms have been characterized during soil resource mapping of the state on 1:250,000 scale (Haldar *et al*.1996) and three soil orders namely Entisols, Inceptisols and Alfisols were observed in Ranchi district. The soils of the district are mostly of the residual type. High temperature and high rainfall have led to the formation of lateritic type of soils from rocks of Archean metamorphic complex exposed in the greater part of the district. Texturally the soils of the district have been classified into four classes. These are stony and gravelly soils, red and yellow soils, lateritic soils and alluvial soil.

3.1.7 Agriculture

Agriculture is the principal occupation of this district. The most important crops which are cultivated in the district are paddy, pulses and wheat. The major horticultural crops are cauliflower, potato, cabbage, broccoli, tomato, brinjal, chilli, ladies finger, bitter gourds, ridge gourds and sponge guards. In addition to that different bio - resources are being utilized by the mankind in various ways *viz*., timber, fuel wood, food, medicinal plants, lac, cotton rearing, silk and other non timber forest uses. Ranchi contributes about 29.31 per cent of lac production in the state which makes district the largest producer in the State.

Table 3.1. Land utilization pattern for Ranchi district.

Sl. No.	Category	Area in hectares	Percentage to total area
1.	Forests	238937.31	19.42
2.	Barren and uncultivable land	69108.63	5.62
3.	Land put to non agriculture use	99993.78	8.13
4.	Cultivable waste	46917.12	3.81
5.	Permanent pastures and other grazing lands	4749.20	0.38
6.	Land under miscellaneous tree crops and groves	4919.85	0.40
7.	Current fallows	301113.19	24.47
8.	Fallow land other than current fallow lands	168912.68	13.72
9.	Net area sown	295965.31	24.05
10.	Total geographical area	1230617.07	100

Source: Agricultural statistics 2013-14, Government of Jharkhand.

3.1.8 Lac

Lac has been a traditional source of livelihood for thousands of tribal families living in the forest fringes of Jharkhand. These tribal families primarily depend on agriculture for their livelihood, which is insufficient to provide them with food security and round-the-year income and therefore, lac cultivation with host resources readily accessible within their surrounding help in achieving the round the year income goal. The lac industries situated in Ranchi mainly produce button lac and shellac alongwith it's by product like kuhni, mollama, patti *etc.*

3.2 SAMPLING DESIGN

3.2.1 Selection of District:

Ranchi district was selected purposively because it is having extensive area under lac production and is highest producer of lac in the state as presented in the Table 3.2.

3.2.2 Selection of the Block:

The list of all the eighteen blocks of Ranchi district was prepared and three blocks *viz*., Namkum, Angara and Bundu were purposively selected based on the highest production of lac.

3.2.3 Selection of the Villages

Multistage purposive cum random sampling technique was adopted for the selection of study area and sample respondents for collection of information required for the study. About 29.31 per cent of total lac production is contributed by Ranchi so it was purposively selected. In the first stage, three blocks were selected by simple random sampling technique out of eighteen development blocks in the district where lac cultivation are practiced. In the second stage, two villages from each block totaling six villages are selected in random manner.

Table 3.2. Lac production in different districts of Jharkhand

Sl no.	District name	Total production (1,000 tonnes)	Ranks in state
01	Ranchi	2530	1
02	Simdega	1910	2
03	Khunti	1380	3
04	Gumla	1330	4
05	West Singhbhum	860	-
06	Palamau	375	-
07.	Garhwa	65	-
08.	Latehar	62	-
09.	Others	630	

Source: Lac, Plant Resins and Gums Statistics 2015: At a glance

Table 3.3. Distribution of sample farmers selected for the study

Districts	Blocks	Villages	Number of respondents
RANCHI	**1.Namkum**	Hahap	15
		Heslatoli	15
		Sub total	30
	2.Angara	Hesal	15
		Jonha	15
		Sub total	30
	3. Bundu	Roredih	15
		Hesapiri	15
		Sub total	30
		TOTAL	**90**

3.2.4 Selection of Farmers

The data was collected from three blocks, namely Namkum, Angara and Bundu of Ranchi district. In Namkum block, farmers belonging to two villages namely, Hahap, Heslatoli; in Angara block lac growers of Hesal and Jonha villages and Roredih and Hesapiri villages of Bundu block were interviewed for the purpose. Fifteen growers from each of the six villages were selected, thus making it 90 lac growers for the study as shown in the Table 3.3.

Sturges' Rule

The farmers were stratified into small, medium, large and very large groups on the basis of total number of host trees owned by the growers, following the Sturges' rule as indicated in the Table 3.4. According to him, number of classes can be determined by the formula:

$$k = 1+3.322 \log N$$

Where,

N = Total number of observations.

Log = logarithms of the number.

The number of respondents was very less in the very large categories. So they all are clubbed to form a single category having the total host trees owned lying between 60 to 215.

3.3 COLLECTION OF DATA

The data used in the study to fulfill various objectives were collected from the selected farmers through personal interview with the help of pretested schedule designed for the purpose. The data on family composition, land holding, host tree utilization and literacy of the selected respondents were collected. Besides, data on technical coefficients in the cultivation of lac and price of factors and products were collected.

The data on marketing costs for important marketing channels of lac in the study area were also collected. The data about the lac processing industry in the study area was taken to estimate their cost and returns. Further, an opinion survey was conducted to find out the constraints faced by the farmers in the cultivation and marketing of lac. Every effort was made at the time of interview to convince the respondents that the study was undertaken purely for the research and not for any other purpose. The data for the present study pertained to the agriculture year 2015 -2016.

3.4 METHOD OF COMPUTATION

An economic analysis of lac cultivation necessitates proper estimation of cost of resources and resource services and the valuation of output. The following procedures were employed in computing the production costs of the lac enterprise.

3.4.1 Operation-wise Human Labour Utilization

Labour can be the physical or mental work that is done by a person with motive of earning money. It includes work done by growers, workers or labourers. Lac cultivation is the labour intensive activity because of the maximum involvement of lac growers performing the maximum activities through using the physical labour. Labour consists of family labour and hired labour. Actual days worked while performing different cultural operations in the production of lac were recorded separately for male, female, family and hired labour. The woman-days were converted into man-equivalent days by assigning a ratio of 1.50 woman-days equivalent to one man-equivalent day. Human labour was quantified in terms of productive man work units (usually about 8 hours of production work). Wages, whether paid in cash or kind or in combination of both were computed in rupee equivalent. Family labour was valued at the prevailing wage rates as that of casual labour for the similar operation in the study area.

Table 3.4: Different categories of lac growers

Categories of the growers	Total host trees owned	Total number of growers
Small	0-33	21
Medium	34-46	20
Large	47-59	30
Very large	60-215	19

3.4.2 Cost of Broodlac

The cost of broodlac is one of the major cost involved in lac cultivation. It was estimated by multiplying the quantity required by the prevailing market prices. In case of *kusumi* and *rangeeni* crop different prices were taken to arrive at the cost.

3.4.3 Expenses on Plant Protection Chemicals

The cost of plant protection chemicals was estimated on the basis of recommended dose and prevailing market price.

3.4.4 Interest on Working Capital

The interest on the working capital was calculated at the rate of 15 per cent per annum that matches the interest rate being currently charged by commercial bank under KCC scheme. Imputed value of family labour was excluded while computing interest on working capital.

3.4.5 Repairs and Maintenance Charges

Repairs and maintenance charges of machinery and implements used in the production of lac were computed on the basis of actual amount incurred by the farmers. The maintenance cost of each type of host tree including expenditure on insectide and pesticide, labour and miscellaneous expenditure.

3.4.6 Interest on Fixed Capital

The interest on the fixed capital was calculated at the rate of 10 per cent per annum that matches the interest rate being currently charged by commercial bank under KCC scheme.

3.4.7 Depreciation

Annual amount of depreciation on each working asset owned by the farmers was calculated following the straight line method. Later it was apportioned based on the duration and acreage of crop on the basis of following straight line method:

$$\left[\text{Depreciation} = \frac{\text{Purchase value} - \text{Junk value}}{\text{Expected life span}}\right]$$

3.4.8 Marketing Aspects of Lac

3.4.8.1 Marketing Cost:

These include weighing, loading and unloading charges, transportation and rent *etc* which were paid by the market functionaries per quintal.

3.4.8.2 Marketing Margins

Marketing margins referred to the net share to the different market intermediaries for a particular quantity of produce, after deducting marketing costs from gross marketing margins at each stage of marketing. Marketing cost and margin is analysed by mentioning the difference in prices at different stages in marketing channels and also the cost involved at each of different stages. The cost and margins of different stages of marketing channel were assessed by applying following method:

$$TC_{im} = C_i + MC$$

$$AM_i = SP_i - (PP_i + MC_i)$$

$$P_s = P_p / C_p$$

Where,

$TC_{im,}$ is the total cost of lac marketing.

$C_{i,}$ is the cost borne by the lac growers in marketing of lac.

$MC_{i,}$ is the marketing cost incurred by the middlemen.

AM_i, is the absolute margin of i^{th} middlemen.

SP_i, is the selling price of i^{th} middlemen.

PP_i, is the purchase price of i^{th} middlemen.

3.5 TOOLS OF ANALYSIS:

Conventional analysis was employed to analyze the data and to arrive at valid conclusions. Simple arithmetic averages and percentages were worked out to find out costs, returns and marketing cost and margins. The tools are:

3.5.1 Conventional Analysis

3.5.1.1 Cost concepts

Cost concepts defined by Commission for Agricultural Costs and Prices (CACP) were followed. Cost concepts were used to estimate the cost of cultivation and to derive the measures of efficiency *viz*., farm business income, family labour income, net income and farm investment income. The cost concepts *viz*., $CostA_1$, $CostA_2$, $CostB_{1,}$ $CostB_2$, $CostC_1$, $CostC_2$ and $CostC_3$ were used in the present study and they are derived as follows.

3.5.1.1.1 Cost A_1

This cost includes value of hired human labour, owned and hired cattle labour, owned and hired tractor services, seeds, fertilizers, farm yard manure, plant protection chemicals, depreciation, repairs, land revenue and interest on working capital. In the present study of lac cultivation, Cost A_1 includes value of hired human labour, cost of broodlac used for inoculation of trees, plant protection chemicals, depreciation, repairs and interest on working capital .

3.5.1.1.2 Cost A_2

Cost A_1+ rent paid for leased in land. As for the present study, basically trees which are easily accessible are used for lac cultivation on their owned land so value of leased in land will be zero. Therefore, the cost A_1 and cost A_2 will be same

3.5.1.1.3 Cost B_1

Cost A_1+ interest on value of owned capital assets (excluding land).

3.5.1.1.4 Cost B_2

Cost B_1+ rental value of owned land (net of land revenue) and rent paid for leased- in land. As for the present study there was no leased in land used, therefore the value of cost B_1 and B_2 will be same.

3.5.1.1.5 Cost C_1

Cost B_1+ imputed value of family labour.

3.5.1.1.6 Cost C_2

Cost B_2+ imputed value of family labour. As, the Cost B_1 and Cost B_2 is same. Therefore, the Cost C_1 and Cost C_2 will be same which can be taken as Cost C

3.5.1.1.7 Cost C_3

Cost C_2+ 10 per cent of Cost C_2 as management cost (on account of managerial functions performed by farmers). The Cost C_3 is calculated by adding 10 percent as management cost to Cost C.

3.5.1.2 Farm Income Measures:

Farm business income = Gross income – Cost A_1 (Cost A_2 in case of tenant operated land).

Family labour income = Gross income - Cost $B_{2.}$

Net Income = Gross income - Cost $C_{2.}$

Farm investment income = (Gross income – Cost C_3) +

(Cost B_2 – Cost $A_{2)}$

3.5.2 Price Spread

It is calculated by taking difference between the price paid by the consumer and the price received by the producer for an equivalent quantity of farm produce.

3.5.3 Producer's share in consumer's rupee

It is the price received by the producer expressed as a percentage in the consumer's price, and then the producer's share in consumer's rupee (P_S) may be expressed as follows

$$P_S = \frac{P_p}{P_c} \times 100$$

Where,

P_S, is the lac grower share in consumer rupee.

P_p, is the lac grower's price.

P_c, is the consumer's price.

3.5.4 Cost and returns of processing of lac

Break even and business ratio analysis were employed.

3.5.4.1Break even analysis:

Break even analysis was attempted to study the relationship between the total cost and total revenue. It is done using following formula,

$$X = \frac{F}{P - V}$$

Where,

X = Volume of lac.

P = Price per unit (Rs.)

V= Variable cost per unit (Rs.)

F= Fixed cost (Rs.)

3.5.4.2 Business ratio analysis

This identifies the efficiency and profitability of processing unit. It comprises of following:

1. Total assets turnover $= \frac{\text{Gross Returns}}{\text{Total Assets}}$

Gross returns are total sales (sale proceeds of lac) in processing unit.

2. Return on assets $= \frac{\text{Net Returns}}{\text{Total Assets}}$

3. Return per Rs. 1000 of working cost $= \frac{\text{Gross Returns}}{\text{Working cost}} \times 1000$

4. Net profit margin $= \frac{\text{Net profit}}{\text{Gross return}} \times 100$

5. Capital turnover $= \frac{\text{Gross returns}}{\text{Total investment}}$

6. Return on total capital employed $= \frac{\text{Net income}}{\text{Total capital employed}}$

Hence, total capital employed includes fixed cost, fixed assets and working cost.

3.5.5 Garrett's ranking technique:

In this method, respondents are asked to rank the specific problems faced by them according to their own perception. The assigned rank is converted into percentage position which gets subsequently transferred into Garrett score using Garrett's table. For each constraint, scores of individual respondents are added together and then divided by total number of respondents. Thus, mean score for each constraint has been ranked by arranging them in descending order.

$$\text{Percentage position} = \frac{100(R_{ij} - 0.50)}{N_j}$$

where,

R_{ij} = Rank given for the i^{th} item by the j^{th} individual and

N_j = Number of items ranked by the j^{th} individual.

3.6 TERMS AND CONCEPTS USED IN THE STUDY

The following are the terms and concepts used in the present study.

3.6.1 Man – days.

It refers to the work accomplished by a normal healthy human being in a day of 8 hours.

3.6.2 Cost of Cultivation

Cost of various inputs and input services used for raising a crop per unit area.

3.6.3 Cost of Production

The expenses incurred on inputs and input services in producing a unit quantity of output.

3.6.4 Variable Cost

Cost associated with the using of variable resources *viz*., broodlac, human labour, plant protection chemicals, interest on working capital *etc*.

3.6.5 Fixed cost

Cost associated with the owning of fixed resources. Depreciation and interest on fixed capital were considered as fixed cost.

3.6.6 Net cost:

Net cost is the gross cost of an object, reduced by the benefits gained from owning the object.

3.6.7 Gross Returns

These are total receipts obtained by selling broodlac and scrapped lac.

3.6.8 Net Returns

These are the profit left with after deducting the total cost of cultivation (net cost in case of lac cultivation) from Gross Returns.

Chapter ~ IV

Results & Discussion

Chapter – IV

RESULTS AND DISCUSSION

The data collected from ninety lac growers were processed and analyzed with reference to specific objectives of the study. In this chapter, the results of the study along with the discussion are presented in the following order.

4.1 Socio-economic characteristics of the respondents

4.2 Input use pattern in lac cultivation

4.3 Economic aspects of lac production

4.4 Marketing aspects of lac

4.5 Processing aspects of lac

4.6 Constraints in the production and marketing of lac.

4.1 SOCIO-ECONOMIC CHARACTERISTICS OF THE RESPONDENTS

The socioeconomic profile shows the social and financial status of the farm families. In this section, average size of the family, farm size and farm inventory are discussed.

4.1.1 Family Composition of Sample Lac Growers

The family composition of selected lac growers according to size groups is presented in Table 4.1. The average family size was 5, 4.5, 4.8 and 5.32 members in the case of small, medium, large and very large farmers respectively, whereas the same was 4.86 for pooled farmers. The composition of family, with respect to children was larger on very large farms compared to other farms. The result was in conformity with the findings of Yogi *et al.* (2014).

Table 4.1.Family composition of selected farms

Sl no.	Categories of households	Number of households	Family composition			
			Male	Female	Children	Total
01.	Small (0-33)	21	1.14 (22.80)	1.1 (22.00)	2.76 (55.20)	5 (100)
02.	Medium (34-46)	30	1.2 (26.66)	1.07 (23.77)	2.23 (49.55)	4.5 (100)
03.	Large (47-59)	20	1.15 (23.95)	1.05 (21.87)	2.6 (54.16)	4.8 (100)
04.	Very large (60-215)	19	1.21 (22.74)	1.11 (20.86)	3 (56.39)	5.32 (100)
05.	Pooled	90	1.18 (24.27)	1.08 (22.22)	2.6 (53.49)	4.86 (100)

Note: Figures in parenthesis shows percentages to total.

4.1.2 Average Size of Land Holding

The scale and efficiency of production and income earning capacity of farm business depends on the size of the holding. The Table 4.2 presents land holding particulars of the sample farmers.

The average size of the land holding varied from 2.30 hectares on the small farms followed by the 3.19 hectares on medium farms, 3.85 hectare on large farms and 5.15 hectares of the very large farms, with an overall average of 3.54 hectares. Of the 2.30 hectares operated by small farmers, the share of the irrigated land was 0.80 hectares (34.78 %), dryland was 1.40 hectares (60.87 %). On medium farms, the irrigated land constituted about 1.01 hectares (31.66 %) and the dryland 2.02 hectares (63.33 %). In large farms, the irrigated land constituted 1.25 hectares (32.46 %) and the dryland constituted 2.50 hectares (64.94 %). On the very large category farms, the irrigated land constituted about 2.01 hectares (39.03 %) and that of dryland is 3.00 hectares (58.25 %). This clearly indicated the predominance of dryland cultivation. In the study area, most of the crops were raised under rainfed condition. The percentage of land leased in deceases with the increase of the categories of lac growers. This shows an inverse relation of land leased in with categories of lac growers. On the basis of total number of host trees available to the lac growers they were classified into small, medium, large, very large and pooled by following the Sturges rule.

4.1.3 Educational Status of the Sample Lac Growers

The educational status of the sample lac growers according to size group is presented in Table 4.3. The educational status was 66.67 per cent, 76.67 per cent, 80.00 per cent and 84.21 per cent in case of small, medium, large and very large category respectively. The literacy rate was highest in case of very large group of lac growers, followed by large, medium and small lac grower group respectively besides very large group has 26.31 per

4.2. Average size of land holding of sample farmers

(Area in hectares)

Sl no.	Category	Number of household	Land utilization pattern			
			Irrigated (hectare)	Dryland (hectare)	Land leased in. (hectare)	Total (hectare)
01.	Small (0-33)	21	0.80 (34.78)	1.40 (60.87)	0.10 (4.35)	2.30 (100.00)
02.	Medium (34-46)	30	1.01 (31.66)	2.02 (63.32)	0.16 (5.02)	3.19 (100.00)
03.	Large (47-59)	20	1.25 (32.46)	2.50 (64.94)	0.10 (2.60)	3.85 (100.00)
04.	Very large (60-215)	19	2.01 (39.03)	3.00 (58.25)	0.14 (2.72)	5.15 (100.00)
05.	Pooled	90	1.22 (34.46)	2.19 (61.87)	0.13 (3.67)	3.54 (100.00)

Note: Figures in parenthesis indicates percentages to total area

Table 4.3. Educational status of the households across various categories.

(In percentages)

Sl no.	Categories of households	Number of households	Illiterate	Literate				
				Primary	Secondary	Matric	Intermediate	Total
01.	Small (0-33)	21	33.33(7)	14.29(3)	28.57(6)	14.29(3)	9.52(2)	66.67(14)
02.	Medium (34-46)	30	23.33(7)	20.00(6)	33.33(10)	13.33(4)	10.00(3)	76.67(23)
03.	Large (47-59)	20	20.00(4)	15.00(3)	30.00(6)	30.00(6)	5.00(1)	80.00(16)
04.	Very large (60-215)	19	15.79(3)	10.52(2)	21.05(4)	26.31(5)	26.31(5)	84.21(16)
05.	Pooled	90	23.33(21)	15.56(14)	28.89(26)	20.00(18)	12.22(11)	76.67(69)

Note: Education in number of schooling years, Figures in parenthesis indicates the number of households

cent of the lac growers having qualification of Intermediate (class 12). This shows that there is direct relationship between the educational status and category of lac growers.

4.1.4 Effective Host Tree for Lac Cultivation Across Various Categories of Lac Growers.

The effective host tree utilized by the lac growers according to the size group is presented in the Table 4.4 and Figure 4.1, Figure 4.2 and Figure 4.3. The total available host trees are 29, 39, 51, 80 and 48 for small, medium, large, very large and pooled farmers. The lac growers followed coupe system of lac cultivation as they use a part of the total number of trees available to them. In case of small farms, 14 (48.27 %) out of the 29 available host trees were used, in case of medium farms lac growers used 20 host trees (51.28 %), 27 host trees (52.94 %) out of the 51 available trees were utilized by large farms and lastly very large farms utilized about 50 trees (62.50 %) out of the 80 available host trees. The average host tree utilization is 54.16 per cent of the available host trees. The data in the Table 4.4 presented that there is an increasing trend of the lac host utilization with the increase in the categories of the lac growers. This result was in conformity with the findings of Jaiswal *et al*. (2006).

4.2 INPUT USE PATTERN IN LAC CULTIVATION

4.2.1. Human Labour Utilization

Human labour is considered to be one of the most important input services influencing the cost structure. Lac cultivation is a labour intensive activity. The use of this input service depends on the type and size of the enterprise. The data presented in the Table 4.5 presents the employment generation from lac cultivation in different categories of lac growers in different operation.

Table 4.4. Effective host tree for lac cultivation of selected farms.

(Average trees per househols)

Sl no.	Category	Number of households	Available host trees				Host trees utilized			
			Kusum	***Palas***	***Ber***	**Total**	***Kusum***	***Palas***	***Ber***	**Total**
01.	Small (0-33)	21	9	8	12	29	4 (44.44)	4 (50.00)	6 (50.00)	14 (48.27)
02.	Medium (34-46)	30	14	10	15	39	7 (50.00)	5 (50.00)	8 (53.33)	20 (51.28)
03.	Large (47-59)	20	17	12	22	51	10 (58.82)	6 (50.00)	11 (50.00)	27 (52.94)
04.	Very large (60-215)	19	20	20	40	80	13 (65.00)	11 (55.00)	26 (65.00)	50 (62.50)
05.	Pooled	90	15	12	21	48	8 (53.33)	6 (50.00)	12 (57.14)	26 (54.16)

Note: Figures in parenthesis shows percentages to total available trees

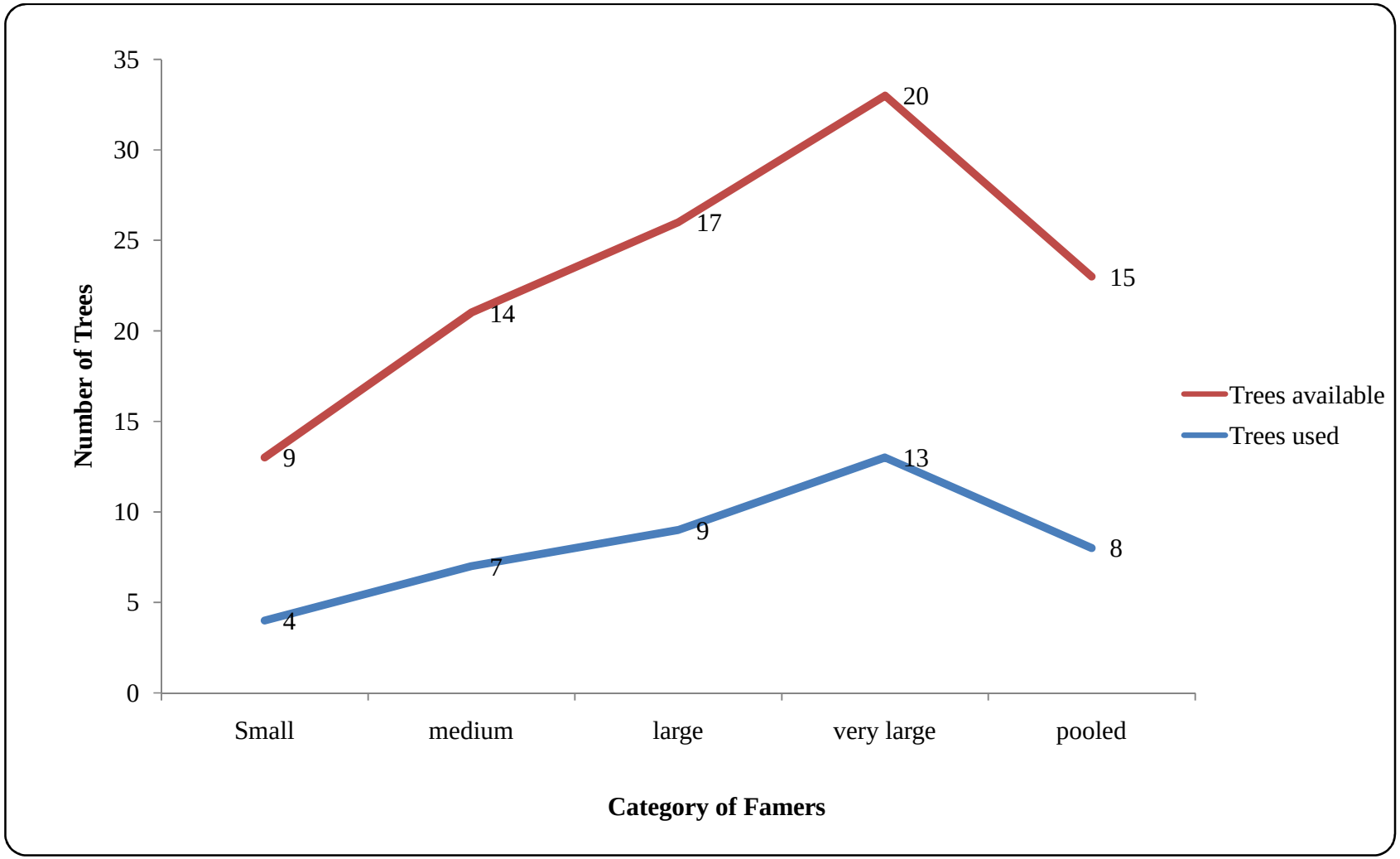

Fig. 4.1. Host utilization pattern in kusum trees

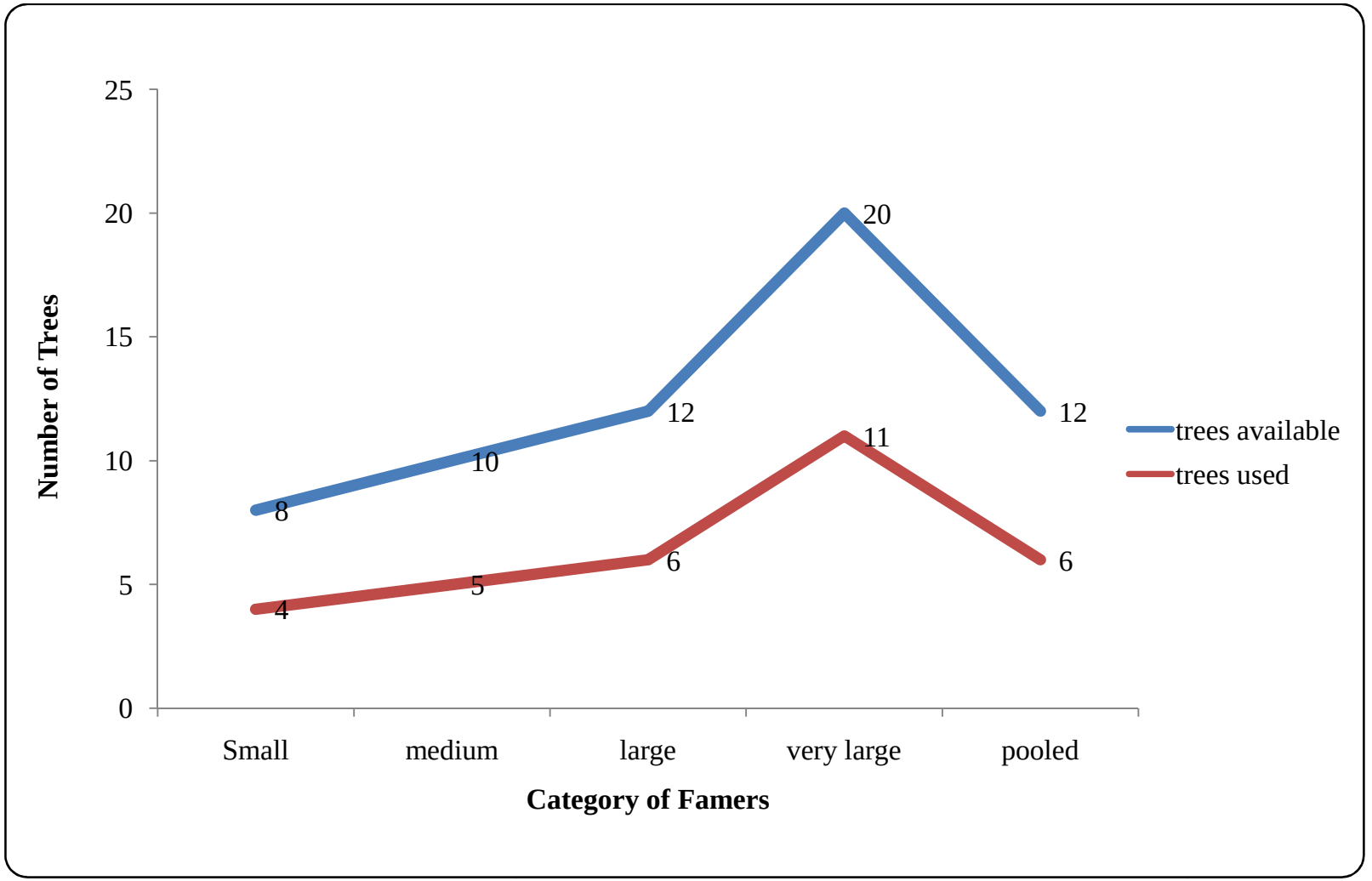

Fig.4.2. Host utilization pattern in palas trees.

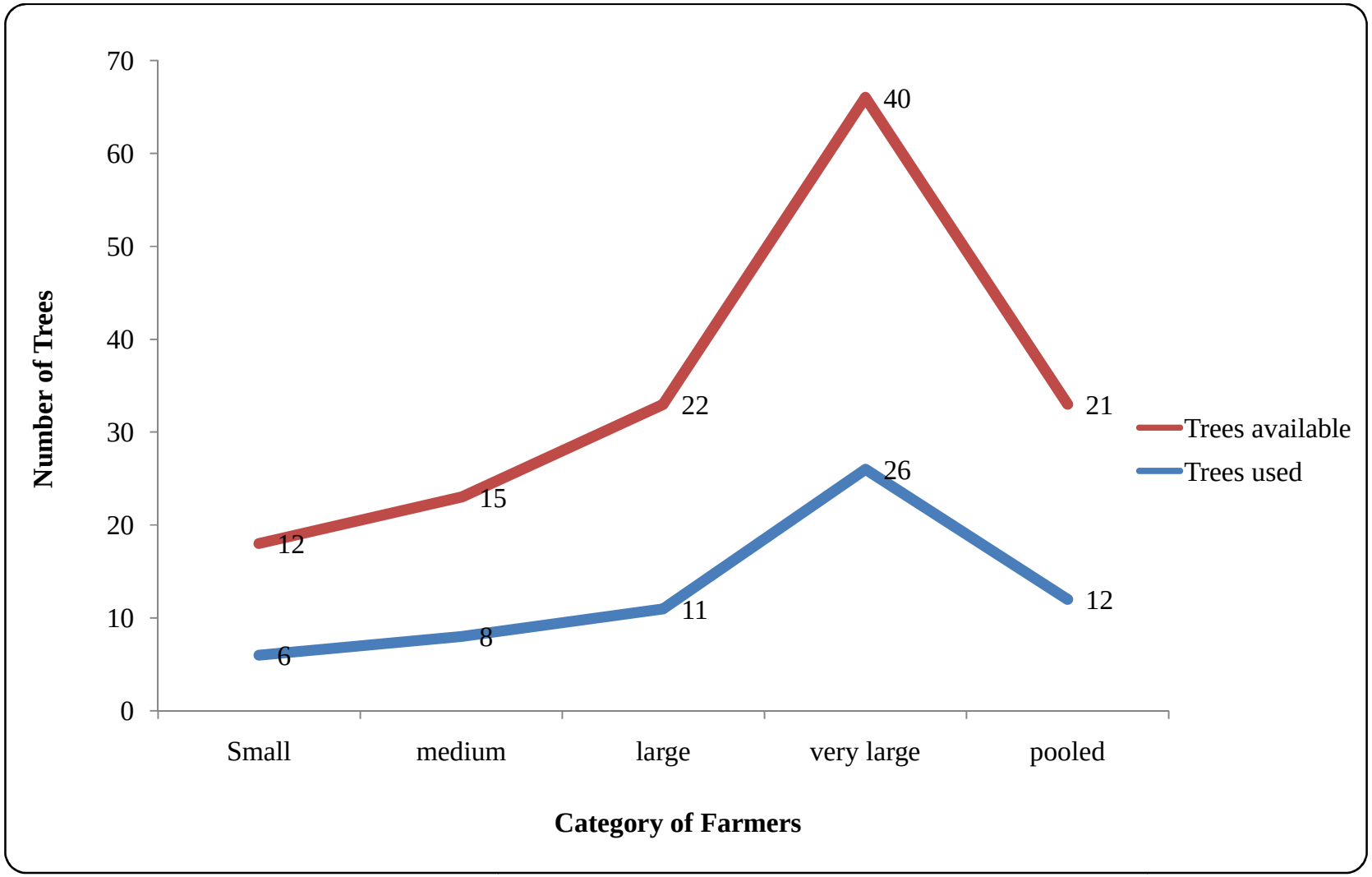

Fig. 4.3. Host utilization pattern in ber trees

4.5. Human labour utilization – operation wise in lac cultivation

(In mandays)

Sl no.	Category	Average labour involved in the activities of lac cultivation in all the three host trees								
		Pruning	**Inoculation of broodlac**	**Phunki removal**	**Insecticidal spray**	**Harvesting of arilac**	**Harvesting of broodlac**	**Scrapping of phunki**	**Bagging**	**Total**
1.	Small (0-33)	2.38 (5.56)	10.06 (23.51)	4.71 (11.01)	3.55 (8.30)	4.75 (11.10)	10.75 (25.12)	4.67 (10.91)	1.92 (4.49)	42.61 (100)
2.	Medium (34-46)	3.88 (8.14)	10.14 (21.26)	5.77 (12.10)	4.25 (8.91)	5.35 (11.22)	10.98 (23.02)	4.96 (10.40)	2.36 (4.95)	47.69 (100)
3.	Large (47-59)	4.04 (7.99)	10.27 (20.32)	6.03 (11.93)	4.78 (9.46)	6.45 (12.76)	11.00 (21.76)	5.35 (10.58)	2.63 (5.20)	50.55 (100)
4.	Very large (60-215)	5.97 (8.62)	17 (24.53)	7.86 (11.34)	7.59 (10.95)	7.03 (10.15)	14.07 (20.31)	6.56 (9.47)	3.21 (4.63)	69.29 (100)
5.	Pooled	4.01 (7.76)	11.6 (22.44)	6.02 (11.65)	4.91 (9.50)	5.81 (11.24)	11.53 (22.30)	5.32 (10.29)	2.49 (4.82)	51.69 (100)

Note: Figures in parenthesis shows percentages to the total

Lac cultivation was carried out on three types host trees *i.e* Kusum, Ber and Palas. Kusum tree is used for cultivation of two crops of *kusumi* strain (Jethwi and Aghani). Jethwi crop is cultivated during first fortnight of January-February and Aghani crop is cultivated during first fortnight of June- July. Palas is used for cultivation of two crops of *rangeeni* strain (Baisakhi and Katki). First fortnight of October – November and June – July is the normal cultivation time for Baisakhi and Katki crops. Ber is used for cultivation of both *kusumi* and *rangeeni* strains of lac insect. A part of the total trees available to lac growers were selected for lac cultivation.

To begin lac cultivation on the host tree, the availability of tender shoots of sufficient length was ensured as lac insect survives on such shoots. In order to get tender shoots, the trees were pruned at proper time. Under the normal condition, the kusum trees were pruned 18 months prior to inoculation in order to have sufficient tender shoot available at the time of inoculation. The proper time for pruning for kusum, Ber tree is January and February and for palas tree is April. This operation employed 2.38 mandays in 14 trees, 3.88 mandays in 20 trees, 4.04 mandays in 27 trees, 5.97 mandays in 50 trees and 4.01 mandays in 26 trees per annum for small, medium, large, very large and pooled category of lac growers.

The critical input of lac cultivation is broodlac which act as a seed to raise the new crop of lac. Broodlac is the lac stick with mature female insect. Quality broodlac was selected, collected and are bundled with nylon netting bag (33× 10 centimeter). The prepared bundles of broodlac were tied on the lower part of the pruned point. Swarming of insect occurs within 3 weeks of inoculation. For the inoculation, 10.06 mandays in 14 trees, 10.14 mandays in 20 trees, 10.27 mandays in 27 trees, 17 mandays in 50 trees and 11.6 mandays in 26 trees per annum were used in small, medium, large, very large and pooled category of lac growers.

The new crop is prevented from the accessibility of predators by removing the used up broodlac sticks after swarming is completed. The selling of phunki lac provided farmers financial premium as well as environmental premium by reducing the wastage. The phunki removal operation required 4.71 mandays in 14 trees, 5.77 mandays in 20 trees, 6.03 mandays in 27 trees, 7.86 mandays in 50 trees and 6.02 mandays in 26 trees per annum on small, medium, large, very large and pooled farms respectively.

Pest infestation is one of the problems in lac cultivation. Hence, insecticidal spraying is done twice to reduce the pest incidence employing 3.55 mandays in 14 trees, 4.25 mandays in 20 trees, 4.78 mandays in 27 trees, 7.59 mandays in 50 trees and 4.91 mandays in 26 trees per annum in small, medium, large and very large and pooled category lac growers.

Harvesting of ari- lac is the harvesting of immature lac crop that is reaped from the lac host trees. The shoots were harvested with the help of secateurs from the host trees employing 4.75 mandays on 14 trees, 5.35 mandays on 20 trees, 6.45 mandays on 27 trees, 7.03 mandays on 50 trees and 5.81 mandays on 26 trees per annum on small, medium, large, very large and pooled lac farms respectively.

The mature shoots (Broodlac) of the host trees are reaped from the lac host trees which acts as a seed for inoculation of another host trees. For undertaking this operation, the labour requirement was 10.75 mandays on 14 trees, 10.98 mandays on 20 trees, 11.00 mandays on 27 trees, 14.07 mandays on 50 trees and 11.53 mandays on 26 trees per annum in small, medium, large, very large and pooled farms respectively.

Harvested broodlac were scrapped out manually by the lac growers. This operation needed 4.67 mandays on 14 trees, 4.96 mandays on 20 trees, 5.35 mandays on 27 trees, 6.56 mandays on 50 trees and 5.32 mandays on

26 trees per annum in each of the small, medium, large, very large and pooled farms respectively.

Scrapped broodlac was bundled and bagged. In this activity woman labourers were more involved than male labourers. This activity took 1.92 mandays in 14 trees, 2.36 mandays in 20 trees, 2.63 mandays in 27 trees, 3.21 mandays in 50 trees and 2.49 mandays in 26 trees per annum in each of the small, medium, large, very large and pooled lac grower case.

On an average, total human labour utilized in all operations was 42.79 mandays on 14 trees, 47.69 mandays on 20 trees, 50.55 mandays on 27 trees, 69.29 mandays on 50 trees and 51.69 mandays on 26 trees per annum in small, medium, large, very large and pooled farms respectively and thus, indicated direct relationship between human labour used and the size of the farm. The major labour absorbing operations were inoculation of broodlac (22.44 %), harvesting of broodlac (22.30 %), phunki removal (11.65 %), harvesting of ari lac (11.24 %), scrapping of phunki (10.29 %) insecticidal spray (9.50 %), pruning (7.76 %) and bagging (4.82 %) on pooled farms. The operations in lac cultivation are mainly carried out by the members of the households and therefore the amount of the hired labourers was comparatively less.

4.2. 2. Human Labour Utilization Host Tree Wise.

The data in the Table 4.6 gives the information about the employment generation from lac cultivation per tree. This table presented total labour required for lac cultivation per host tree in different operations. The human labour utilization per lac host tree varies from 9.39 in case of small farms, followed by 6.82 in medium farms, 5.57 in case of large farms to 4.46 in very large farms.

4.6. Human Labour Utilization - host tree wise in lac cultivation.

(In mandays per tree)

Sl.No	Category	Labour utilized			
		Kusum	***Ber***	***Palas***	**Total**
1	Small (0-33)	5.60 (59.64)	2.56 (27.26)	1.23 (13.10)	9.39 (100.00)
2	Medium (34-46)	3.55 (52.05)	2.17 (31.82)	1.10 (16.13)	6.82 (100.00)
3	Large (47-59)	2.92 (52.42)	1.68 (30.16)	0.97 (17.42)	5.57 (100.00)
4	Very large (60-215)	2.79 (62.56)	0.96 (21.52)	0.71 (15.92)	4.46 (100.00)
5	Pooled	3.38 (57.00)	1.56 (26.31)	0.99 (16.69)	5.93 (100.00)

Note: Figures in parenthesis shows percentages to the total

The labour employed per host tree in lac cultivation on kusum, ber and palas was 5.60, 2.56 and 1.23 mandays per tree which in totality makes it 9.39 mandays per tree in small farms.

In medium farms, lac cultivation on kusum, ber and palas tree required about 3.55 mandays per tree, 2.17 mandays per tree and 1.10 mandays of labour per tree, thus making it about 6.82 mandays of labour per host tree.

In large farms, for performing the activities of lac cultivation on different host *i.e*, kusum, ber and palas 5.57 mandays of labour per tree was needed which consists of 2.92 mandays per tree on kusum, 1.68 mandays per tree on ber and 0.97 mandays per tree on palas.

For accomplishing the activities of lac cultivation on kusum, ber and palas tree very large farms employed 2.79 mandays per tree, 0.96 mandays per tree and 0.71 mandays per tree respectively. Thus, total labour utilized per tree in this category was 4.46 mandays per tree.

The average labour utilization in different host trees was 5.93 mandays per host tree. On an average the amount of the labour utilized for kusum, ber and palas trees was 3.38 mandays per tree, 1.56 mandays per tree and 0.99 mandays per tree.

The utilization of labour per lac host tree decreases with the increase in the category of lac growers. This is due to economies of scale working in present study of lac cultivation. From the Table 4.6 it was observed that the percentage of labour used for lac cultivation was highest in case of kusum tree followed by ber and palas tree in all the category of lac growers.

4.2.3. Broodlac Used in Lac Cultivation Per Tree

The data presented in the Table 4.7 revealed the requirement of broodlac per tree for inoculation. For this operation 8.07, 7.59, 7.46 and 6.41

kilogram of broodlac per tree were used in case of small, medium, large and very large farms respectively.

For the inoculation of kusum tree small, medium, large and very large farms needed 5.27, 4.85, 4.79 and 3.95 kilogram per tree. The amount broodlac required for inoculation of kusum tree decreases with the increase in the category of lac grower. This can be due to the growers belonging to very large farm has higher educational level in terms of the schooling years and technical knowledge for performing the operations of scientific lac cultivation. As in case of small farms, growers bring more than the quantity of broodlac optimally required for inoculation so as to compensate the loss that occurs due to storing broodlac for longer duration before inoculation which led to swarming of lac insect while in case of very large farms due to higher educational level and technical knowledge, growers bring adequate amount of broodlac at an appropriate time which avoids the problem of swarming of lac insect.

For the inoculation on ber trees *(Zizyphus mauritiana*) small, medium, large and very large farms requires about 1.80, 1.74, 1.67 and 1.46 kilogram of broodlac per tree respectively. The amount of broodlac used per tree decreases with the increase in the size of the farm because of increase in the educational level and presence of technical knowledge of scientific lac cultivation to farmers belonging to higher categories .

For palas (*Butea monosperm*) trees, the amount of broodlac used per host tree in case of small, medium, large and very large category of lac growers are 1 kilogram per tree each . The amount of broodlac used per palas tree is constant in all the categories of lac growers. It is because the production from the palas tree has got reduced over time due to change in the climatic conditions of Ranchi. The average amount of broodlac required for inoculating a host tree is 7.19 kilogram per tree consisting of 4.59, 1.60 and 1 kilogram per tree on kusum, ber and palas respectively.

4.7. Broodlac used in lac production

(In kg per tree)

Sl. No	Category	Broodlac used			
		Kusum	***Palas***	***Ber***	**Total**
1	Small (0-33)	5.27 (65.30)	1.00 (12.39)	1.80 (22.31)	8.07 (100)
2	Medium (34-46)	4.85 (63.90)	1.00 (13.18)	1.74 (22.92)	7.59 (100)
3	Large (47-59)	4.79 (64.21)	1.00 (13.40)	1.67 (22.39)	7.46 (100)
4	Very large (60-215)	3.95 (61.62)	1.00 (15.60)	1.46 (22.78)	6.41 (100)
5	Pooled	4.59 (63.84)	1.00 (13.91)	1.60 (22.25)	7.19 (100.00)

Note: Figures in parenthesis indicates percentages to the total

4.3 ECONOMIC ASPECTS OF LAC PRODUCTION

Cost of production of any crop product is the sum total of several components of cost. The profitability of any enterprise depends upon costs and returns. Accurate measurements of all the components of costs is thus of crucial importance for correct assessment of cost of production of any commodity. The particulars of cost of cultivation of lac according to size groups are presented below,

Cost of cultivation of a commodity is the sum total of cost incurred on various inputs that are used in the production of the commodity. Costs incurred on a farm can be classified as variable cost and fixed cost. In economic analysis of any business enterprise; the fixed costs and variable costs are taken into account to arrive at total costs and thereby to compute the profits. Variable costs include expenses on labour employed to perform different cultivation practices and also expenses incurred on material inputs such as broodlac, plant protection chemicals etc. The fixed costs are depreciation on fixed assets, interest on fixed capital.

4.3.1. Cost of Cultivation of Lac in Small Category Lac Growers.

The Table 4.8 shows the total cost of cultivation of lac in case of small farm. On an average, the total cost of cultivation for 14 host trees in case of small farm was Rs.20807.36 consisting of Rs. 11735.86 for 4 kusum trees, Rs. 1708.55 for 4 palas host trees and Rs. 7362.95 for 6 ber host trees. The break-up of total costs into variable costs and fixed costs indicated that the variable costs were Rs. 10844.59 for 4 kusum trees (92.40 %), Rs. 1538.55 for 4 palas trees (90.05 %), Rs. 6849.67 for 6 ber trees (93.03 %) while the fixed costs were Rs. 891.27 per 4 kusum tree (7.60 %) Rs. 170.00 for 4 palas trees (9.95 %) and Rs. 513.28 for 6 ber trees (6.97 %).

Broodlac was one of the highest costing inputs in the cultivation of lac. The expenditure incurred by small farms towards this resource was Rs.

Table 4.8. Cost of cultivation of lac in small category lac growers.

(In rupees)

Sl no.	**Category**	**Particulars**	***Kusum*** **(4 trees)**	***Palas*** **(4 trees)**	***Ber*** **(6 trees)**
01.	Small (0-33)	**Operational cost**			
		Broodlac	4219.05 (35.95)	457.14 (26.76)	2142.86 (29.10)
		Labour	3352.91 (28.57)	735.14 (43.02)	2303.40 (31.28)
		Pesticides	2100.00 (17.89)	200 (11.71)	1680.00 (22.82)
		Interest on working capital	1172.63 (9.99)	146.27 (8.56)	723.414 (9.83)
		Sub total	10844.59 (92.40)	1538.55 (90.05)	6849.67 (93.03)
		Fixed cost			
		Depreciation	446.66 (3.81)	95.90 (5.61)	290.97 (3.95)
		Interest on fixed capital	444.61 (3.79)	74.10 (4.34)	222.31 (3.02)
		Sub total	891.27 (7.60)	170.00 (9.95)	513.28 (6.97)
		Total	11735.86 (100.00)	1708.55 (100.00)	7362.95 (100.00)

Note: Figures in the parenthesis indicate percentages to the total.

4219.05 for 4 kusum host trees (35.95 %), Rs. 457.14 for 4 palas trees (26.76 %) and Rs. 2142. 86 per 6 for trees (29.10 %).

Human labour is required to perform various cultural practices *viz.*, pruning, selection and inoculation of broodlac, phunki removal, insecticidal spray, harvesting of ari lac, harvesting of broodlac, scrapping of lac and bagging. Of the total costs, human labour was the major item of cost of cultivation of lac accounting of Rs. 3352.91 for 4 kusum trees (28.57 %), Rs. 735.14 for 4 palas trees (43.02 %) and Rs. 2303.40 for 6 ber trees (31.28 %).

Lac crop is prone to severe damage due to biotic and abiotic factors. So integrated pest management approach was followed. The insecticides like fipronil and ethofenprox were sprayed twice. First spraying is done at 30 days after inoculation and second spraying is done after 40 days of inoculation.

The fixed cost consists of depreciation on the fixed capital and interest on fixed capital, as it doesn't require a large plot of land for doing lac cultivation as required in case of other agricultural crops. So, for calculating its fixed cost land revenue and rental value of owned land is not included. Depreciation and the interest on the fixed capital were Rs. 446.66 (3.81 %) and Rs. 444.61 for 4 kusum trees (3.79 %), Rs. 95.90 (5.61 %), and Rs. 74.10 (4.34 %) for 4 palas trees and Rs. 290.97 (3.95 %) and Rs. 222.31 for 6 ber trees (3.02 %).

4.3.2. Cost of Cultivation of Lac in Medium Category Lac Growers.

The Table 4.9 presented total cost of cultivation in case of medium farms on different host trees. The cost of cultivation for 7 kusum trees was Rs. 14685.78, Rs. 2062.06 for 5 palas trees and Rs. 8437.46 for 8 ber trees. The break-up of total costs into variable costs and fixed costs showed that the variable costs were Rs. 13761.16 for 7 kusum trees (93.70 %), Rs.

Table 4.9. Cost of cultivation of lac in medium category lac growers.

(In rupees)

Sl no.	Category	Cost	*Kusum* (7 trees)	*Palas* (5 trees)	*Ber* (8 trees)
02.	Medium (34-46)	**Operational cost**			
		Broodlac	6800.00 (46.30)	680.00 (32.98)	2786.70 (33.03)
		Labour	3276.41 (22.31)	821.90 (39.86)	2605.01 (30.74)
		Pesticides	2100.00 (14.30)	200.00 (9.70)	1680.00 (19.91)
		Interest on working capital	1584.75 (10.79)	184.33 (8.94)	834.25 (9.89)
		Sub total	13761.16 (93.70)	1886.23 (91.47)	7905.96 (93.70)
		Fixed cost			
		Depreciation	458.95 (3.13)	98.22 (4.76)	298.74 (3.54)
		Interest on fixed capital	465.67 (3.17)	77.61 (3.76)	232.83 (2.76)
		Sub total	924.62 (6.30)	175.83 (8.53)	531.57 (6.30)
		Total	14685.78 (100.00)	2062.06 (100.00)	8437.53 (100.00)

Note: Figures in the parenthesis indicate percentages to the total.

1886.23 for 5 palas trees (91.47 %) and Rs. 7905.96 for 8 ber trees (93.70 %) while the fixed costs were Rs. 924.62 for 7 kusum trees (6.30 %), Rs. 175.83 for 5 palas trees (8.53 %) and Rs. 531.57 for 8 ber trees (6.30 %).

The expenditure on broodlac per host trees incurred by medium farm was Rs. 6800.00 on 7 kusum trees (44.77 %), Rs. 680.00 on 5 palas trees (32.98 %) and Rs. 2786.70on 8 ber trees (33.03 %).

The expenditure on human labour per host trees amounted to Rs. 3276.41 for 7 kusum trees, Rs. 821.90 for 5 palas trees and Rs. 2605.01 for 8 ber trees and accounted for 22.31 per cent, 39.86 per cent and 30.74 per cent of total cost.

Integrated pest management approach was followed. The insecticides like fipronil and ethofenprox were sprayed twice. First spraying is done at 30 days after inoculation and second spraying is done after 40 days of inoculation.

The fixed cost incurred consists of the depreciation of Rs. 458.95 for 7 kusum trees (3.13 %), Rs. 98.22 for 5 palas trees (4.76 %) and Rs. 298.74 for 8 ber trees (3.54 %) and the interest on the fixed capital was Rs. 465.67 for 7 kusum trees (3.17 %), and Rs. 77.61 for 5 palas trees (3.76 %) and Rs. 232.83 for 8 ber trees (2.76 %).

4.3.3. Cost of Cultivation of Lac in Large Category Lac Growers.

The total cost of cultivation in case of large category lac growers on kusum was Rs. 17450.83 for 9 trees, Rs. 2406.49 for 6 palas host trees and Rs.9685.14 for ber host trees (Table 4.10). The break-up of total costs consisted of the variable costs of Rs. 16549.33 for 9 kusum trees (94.83 %), Rs. 2217.64 for 6 palas trees (92.15 %) and Rs. 9097.29 for 11 ber trees (93.93 %) and the fixed cost were Rs. 901.50 for 9 kusum trees (5.17 %), Rs. 188.85 for 6 palas trees (7.85 %) and Rs. 587.85 for 11 ber trees (6.07 %).

Table 4.10. Cost of cultivation of lac in large category lac growers

(In rupees)

Sl no.	Category	Cost	*Kusum* (10 trees)	*Palas* (6 trees)	*Ber* (11 trees)
03.	Large (47-59)	**Operational cost**			
		Broodlac	8630.00 (49.45)	855.00 (35.53)	3670.00 (37.89)
		Labour	3941.86 (22.59)	873.38 (36.29)	2766.37 (28.56)
		Insecticides	2100.00 (12.03)	200.00 (8.31)	1680.00 (17.35)
		Interest on working capital	1877.47 (10.75)	289.26 (12.02)	980.92 (10.13)
		Sub total	16549.33 (94.83)	2217.64 (92.15)	9097.29 (93.93)
		Fixed cost			
		Depreciation	418.40 (2.40)	108.33 (4.50)	346.30 (3.58)
		Interest on fixed capital	483.10 (2.77)	80.52 (3.35)	241.55 (2.49)
		Sub total	901.50 (5.17)	188.85 (7.85)	587.85 (6.07)
		Total	17450.83 (100.00)	2406.49 (100.00)	9685.14 (100.00)

Note: Figures in the parenthesis indicate percentages to the total.

Broodlac which is considered as the seed for initiation of lac cultivation costs about Rs. 8630.00 for 9 kusum trees (49.45 %), Rs. 855.00 for 6 palas trees (35.53 %) and Rs. 3670.00 for 11 ber trees (37.89 %).

Lac cultivation is labour intensive activity. Therefore, it requires a large amount of labour to carry out the operations in lac cultivation. The human labour was the major component of cost of cultivation of lac amounting to Rs. 3941.86 for 9 kusum trees (22.59 %), Rs. 873.38 for 6 palas trees (36.29 %) and Rs. 2766.37 for 11 ber trees (28.56 %) in case of kusum, palas and ber trees respectively.

The fixed cost incurred consists of depreciation of Rs. 418.40 for 9 kusum trees (2.40 %), Rs. 108.33 for 6 palas trees (4.50 %) and Rs. 346.30 for 11 ber trees (3.58 %) and the interest on the fixed capital were Rs. 483.10 for 9 kusum trees (2.77 %), Rs. 80.52 for 6 palas trees (3.35 %) and Rs. 241.55 for 11 ber trees (2.49 %).

4.3.4. Cost of Lac Cultivation in Very Large Category Lac Growers.

The cost of cultivation for 50 host trees in case of very large farm was Rs. 39676.24 consisting of Rs. 21013.29 for 13 kusum trees, Rs. 3462.98 for 11 palas host trees and Rs. 15199.97 for 26 ber host trees is presented in the Table 4.11. It includes variable costs which was Rs. 20012.84 for 13 kusum tree (95.24 %), Rs. 3271.84 for 11 palas trees (94.48 %) and Rs. 14621.68 for 26 ber trees (96.20 %) while the fixed costs were Rs. 1000.45 for 13 kusum tree (4.76 %), Rs. 191.14 for 11 palas trees (5.52 %) and Rs. 578.29 for 26 ber trees (3.80 %).

Broodlac was the highest paid inputs in the cultivation of lac. The expenditure incurred by very large farms towards this resource was Rs. 10263.16 for 13 kusum tree (48.84 %), Rs. 1555.26 for 11 palas trees (44.91 %) and Rs. 7578.95 for 26 ber trees (49.86 %).

Table 4.11. Cost of lac cultivation of lac in very large category lac growers

(In rupees)

Sl no.	Category	Cost	*Kusum* (13 trees)	*Palas* (11 trees)	*Ber* (26 trees)
04.	Very large (60-215)	**Operational cost**			
		Broodlac	10263.16 (48.84)	1555.26 (44.91)	7578.95 (49.86)
		Labour	5455.69 (25.96)	1183.54 (34.18)	3754.05 (24.70)
		Insecticides	2100.00 (9.99)	200.00 (5.77)	1680.00 (11.05)
		Interest on working capital	2193.99 (10.45)	333.039 (9.62)	1608.68 (10.59)
		Sub total	20012.84 (95.24)	3271.84 (94.48)	14621.68 (96.20)
		Fixed cost			
		Depreciation	485.23 (2.31)	105.26 (3.04)	320.68 (2.11)
		Interest on fixed capital	515.21 (2.45)	85.87 (2.48)	257.60 (1.69)
		Sub total	1000.45 (4.76)	191.14 (5.52)	578.29 (3.80)
		Total	21013.29 (100.00)	3462.98 (100.00)	15199.97 (100.00)

Note: Figures in the parenthesis indicate percentages to the total.

Lac cultivation utilizes maximum amount of the available labour and therefore, of the total costs, human labour was one of the major components of cost of cultivation consisting of Rs. 5455.69 for 13 kusum tree (25.96 %), Rs. 1183.54 for 11 palas trees (34.18 %) and Rs. 3754. 05 for 26 ber trees (24.70 %) in kusum, palas and ber respectively.

Depreciation was Rs. 485.23 for 13 kusum trees (2.31 %), Rs. 105.26 for 11 palas trees (3.04 %) and Rs. 320.68 for 26 ber trees (2.11 %) and the interest on the fixed capital were Rs. 515.21 for 13 kusum tree (2.45 %), Rs. 85.87 for 11 palas trees (2.71 %) and Rs. 257.60 for 26 ber trees (1.69 %).

4.3.5. Cost of Lac Cultivation in Pooled Category Lac Growers.

It can be seen from the Table 4.12 that the total cost of lac cultivation in case of pooled lac growers on kusum was Rs. 16112.28 for 8 kusum tree, Rs. 2333.60 for 6 palas host trees and Rs.9877.15 for 12 host tree in case of ber. The break-up of total costs into variable costs and fixed costs indicated that the variable costs were Rs.15618.36 for 8 kusum trees (94.14 %), Rs. 2154.7 for 6 palas trees (92.33 %), Rs. 9341.99 for 12 ber trees (94.58 %) while the fixed costs were Rs. 943.92 for 8 kusum trees (5.86 %), Rs. 178.90 for 6 palas trees (7.67 %) and Rs. 535.16 for 12 ber trees (5.42 %).

Broodlac is the input which initiates the cultivation of lac. The expenditure incurred by pooled lac growers for this resource was Rs. 7335.56 on 8 kusum trees (45.53 %), Rs. 851.67 on 6 palas trees (36.49 %) and Rs. 3844.40 on 12 ber trees (38.92 %).

Human labour was the second major item of cost of cultivation of lac in pooled farms mounting to Rs. 4051.52 for 8 kusum trees (25.15 %), Rs. 889.25 for 6 palas trees (38.11 %) and Rs. 2812.53 for 12 ber trees (28.48 %).

Table 4.12. Cost of lac cultivation in pooled category lac growers

(In rupees)

Sl no.	Category	Particulars	*Kusum* (8 trees)	*Palas* (6 trees)	*Ber* (12 trees)
05.	Pooled	**Operational cost**			
		Broodlac	7335.56 (45.53)	851.67 (36.49)	3844.4 (38.92)
		Labour	4051.52 (25.15)	889.25 (38.11)	2812.53 (28.48)
		Insecticides	2100.00 (13.03)	200.00 (8.57)	1680.00 (17.01)
		Interest on working capital	1681.28 (10.43)	213.78 (9.16)	1005.06 (10.17)
		Sub total	15168.36 (94.14)	2154.7 (92.33)	9341.99 (94.58)
		Fixed cost			
		Depreciation on fixed capital	468.84 (2.91)	99.72 (4.28)	297.62 (3.01)
		Interest on fixed capital	475.08 (2.95)	79.18 (3.39)	237.54 (2.41)
		Sub total	943.92 (5.86)	178.90 (7.67)	535.16 (5.42)
		Total	16112.28 (100.00)	2333.60 (100.00)	9877.15 (100.00)

Note: Figures in the parenthesis indicate percentage to the total.

Depreciation and interest on fixed capital are the two main components of fixed cost. Depreciation was Rs. 468.84 for 8 kusum trees (2.91 %), Rs. 99.72 for 6 palas trees (4.28 %) and Rs. 297.62 for 12 ber trees (3.01 %) and the interest on the fixed capital was Rs. 475.08 for 8 kusum trees (2.95 %), Rs. 79.18 for 6 palas trees (3.39 %) and Rs. 237.54 for 12 ber trees (2.41 %).

4.3.6. Cost of Cultivation of Lac in Different Category Lac Growers.

The Table 4.13 and Figure 4.4 show the cost of cultivation in different categories lac growers. The total cost of lac cultivation in case of small farm was Rs. 20807.36 for 14 trees consisting of Rs. 11735.86 for 4 kusum trees (56.40 %), Rs. 1708.55 for 4 trees (8.21 %) and Rs. 7362.95 for 6 ber trees (35.39 %) on kusum, palas and ber respectively.

The cost of cultivation on kusum, palas and ber host trees in medium farm was Rs. 25185.37 for 20 trees comprising of Rs. 14685.78 for 7 kusum trees (58.31 %), Rs. 2062.06 for 5 palas trees (8.19 %) and Rs. 8437.53 for ber trees (33.50 %) respectively.

In large farm, the total cost of cultivation was found Rs. 29542.46 for 27 trees in which cost of cultivation on kusum, palas and ber was Rs. 17450.83 for 9 trees (59.07 %), Rs. 2406.49 for 6 trees (8.15 %) and Rs. 9685.14 for 11 trees (32.78 %) respectively.

The total cost of cultivation of very large farms was mounted to Rs. 39676.24 for 50 host trees consisting of Rs. 21013.29 for 13 kusum trees (52.96 %) of kusum, Rs. 3462.98 for 11 palas trees (8.73 %) of palas and Rs. 15199.97 for 26 ber trees (38.31 %) on ber.

The average cost of cultivation of lac was Rs. 28323.03 for 26 host trees consisting of Rs. 16112.28 for 8 kusum trees (56.89 %), Rs. 2333.60

Table 4.13. Cost of cultivation of lac in different category lac growers

(In rupees)

Sl. No.	Category	*Kusum*	*Palas*	*Ber*	Total
01.	Small (0-33)	11735.86 (56.40)	1708.55 (8.21)	7362.95 (35.39)	20807.36 (100.00)
02.	Medium (34-46)	14685.78 (58.31)	2062.06 (8.19)	8437.53 (33.50)	25185.37 (100.00)
03.	Large (47-59)	17450.83 (59.07)	2406.49 (8.15)	9685.14 (32.78)	29542.46 (100.00)
04.	Very large (60-215)	21013.29 (52.96)	3462.98 (8.73)	15199.97 (38.31)	39676.24 (100.00)
05.	Pooled	16112.28 (56.89)	2333.60 (8.24)	9877.15 (34.87)	28323.03 (100.00)

Note: Figures in the parenthesis indicate percentages to the total

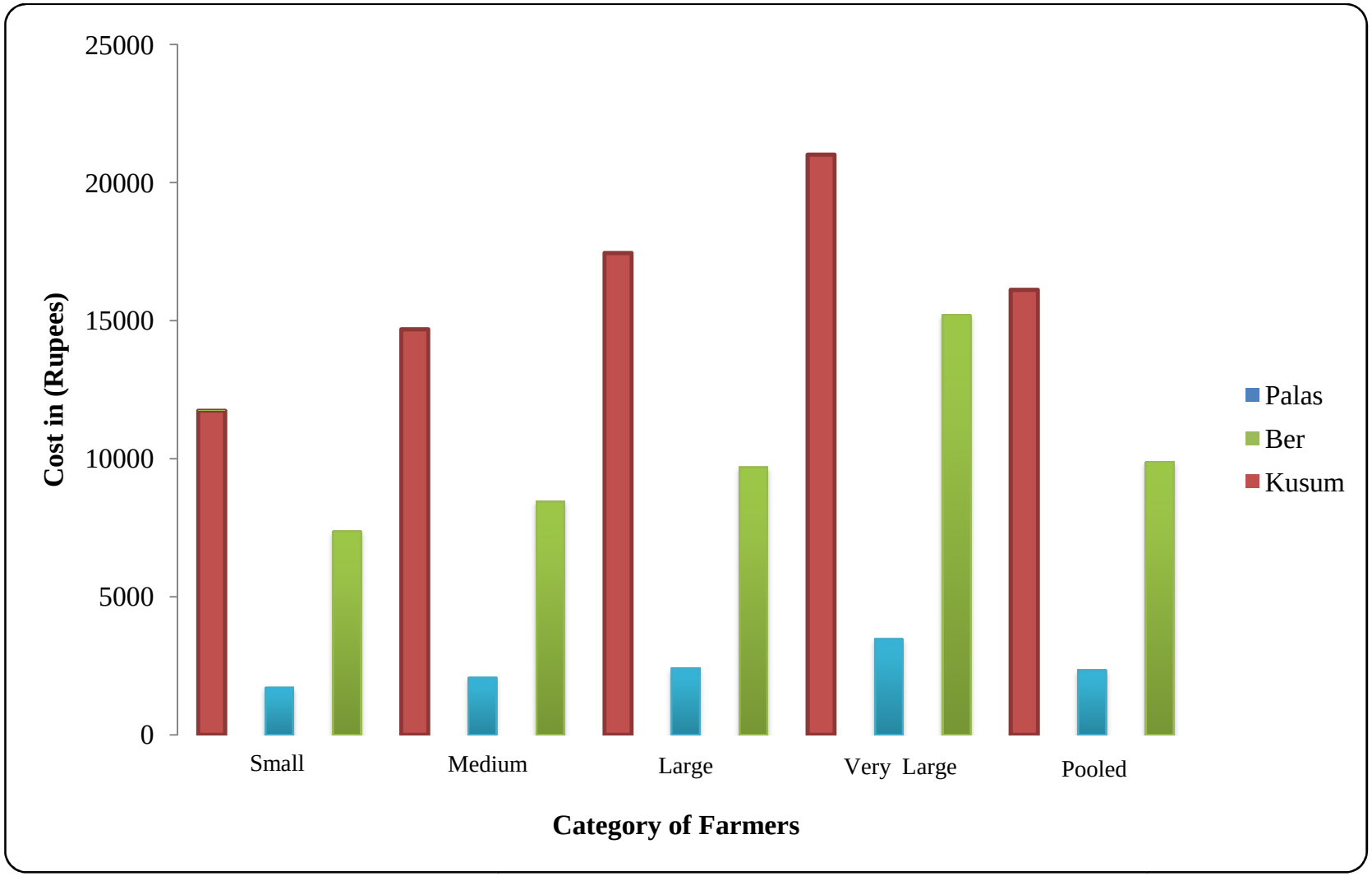

Fig. 4.4. Cost of cultivation of lac in different category lac growers

for 6 palas trees (8.24 %) and Rs. 9877.15 for 12 ber trees (34.87 %) on kusum, palas and ber respectively.

The above table shows that cost of cultivation of kusum host trees forms the major portion in total lac cultivation because the kusum tree supports *kusumi* strain of lac insect, which produces good quality light coloured resin that is in demand by lac industry, thus fetching high remunerative prices to lac growers and due to dense crown of kusum tree, summer lac crop survives better on this host. The ber host trees are used as, management of lac can be carried out from ground itself so women can easily work on this host trees therefore, it is more suitable than palas.

The overall analysis of cost structure of lac cultivation revealed that very large farms incurred higher cost than large, medium and small farms and thus indicating direct relationship between cost of cultivation and categories of lac growers. The difference in the cost of cultivation between the different categories of lac grower was due to the differences in the magnitude of inputs and input services utilization such as human labour, broodlac, plant protection chemicals etc. The cost of human labour, brodlac and plant protections chemical accounted for more than 75 per cent of the total costs. These findings are in accordance with the findings of Mandal *et al*. (2014).

4.3.7 Cost Concepts

The cost of cultivation of lac is also dealt by adopting the cost concepts used in farm management studies *viz*., cost A_1, cost A_2, cost B_1, cost B_2 cost C_1, cost C_2 and cost C_3. The cost of cultivation of lac according to cost concepts was worked out and presented in following tables.

4.3.7.1 Cost concepts – lac cultivation in small farms.

It is clear from the details furnished in the Table 4.14 that there was no leasing activity among the selected farmers and hence cost A_1 and cost A_2 remained same. Similarly, as there was no leasing activity there was no difference between the cost B_1 and cost B_2 also. As cost B_1 and cost B_2 are same then, the cost C_1 and cost C_2 was same. On an average, in case of small farms the cost A_1/A_2 was Rs. 16491.23, cost B_1/B_2 was Rs. 17232.13, cost C_1/ cost C_2 was Rs. 20809.65 and cost C_3 was Rs. 22890.60 for 14 trees.

4.3.7.2 Cost concepts – lac cultivation in medium farms.

The data in the Table 4.15 revealed the cost concepts of medium farm. The cost A_1/ A_2, cost B_1/B_2, cost C_1/C_2 and cost C_3 was Rs. 19829.31, Rs. 20605.25, Rs. 24649.10 and Rs. 27114.28 for 20 trees respectively.

4.3.7.3 Cost concepts – lac cultivation in large farms.

It is shown from the data presented in the Table 4.16 that in the case of large farms the cost A_1/A_2 , cost B_1/ B_2 , cost C_1/ C_2 and cost C_3 was Rs. 24512.68, Rs. 25317.85, Rs. 29541.85 and Rs. 32496.03 respectively for 27 host trees.

4.3.7.4 Cost concepts – lac cultivation in very large farms.

The data in Table 4.17 revealed the case of very large farms that the cost A_1/A_2 was Rs. 32591.27, cost B_1/ B_2 was Rs. 33449.94 and cost C_1/ C_2 and cost C_3 for 50 trees was Rs. 39674.94 and Rs. 43642.43 for 50 trees respectively.

4.3.7.5 Cost concepts – lac cultivation in pooled farms.

From the Table 4.18 it can be seen that in the case of pooled category the cost A_1/A_2, cost B_1/B_2, cost C_1/ C_2 and the cost C_3 was Rs. 23100.43, Rs. 23892.23, Rs. 28323.23 and Rs. 31155.55 respectively for 26 trees.

Table 4.14. Cost concepts – lac - small farm

(In rupees)

Category	Particular	*Kusum* (4 trees)	*Palas* (4 trees)	*Ber* (6 trees)	Total (14 trees)
Small (0-33)	Cost A_1/A_2	9436.78 (73.10)	1217.31 (70.70)	5837.14 (79.41)	16491.23 (79.25)
	Cost B_1/B_2	9882.82 (84.20)	1301.83 (75.61)	6047.48 (82.27)	17232.13 (82.81)
	Cost C_1/C_2	11736.82 (100)	1721.85 (100)	7350.98 (100)	20809.65 (100)
	Cost C_3	12910.50 (109.99)	1894.03 (109.99)	8086.07 (109.99)	22890.60 (109.99)

Note: Figures in the parenthesis indicate percentages to the cost C_1/ C_2.

Table 4.15. Cost concepts – lac - medium farm.

(In rupees)

Category	Particulars	*Kusum* (7 trees)	*Palas* (5 trees)	*Ber* (8 trees)	Total (20 trees)
Medium (34-46)	Cost A_1/A_2	12608.70 (83.03)	1511.45 (73.20)	5709.16 (77.17)	19829.31 (80.45)
	Cost B_1/B_2	13125.39 (86.43)	1591.94 (77.10)	5887.92 (79.59)	20605.25 (83.59)
	Cost C_1/C_2	15186.39 (100)	2064.89 (100)	7397.82 (100)	24649.10 (100)
	Cost C_3	16705.03 (110)	2271.38 (110)	8137.60 (110)	27114.28 (110)

Note: Figures in the parenthesis indicate percentages to the cost C_1/ C_2.

Table 4.16. Cost concepts – lac - large farm.

(In rupees)

Category	Particulars	*Kusum* (9 trees)	*Palas* (6 trees)	*Ber* (11 trees)	Total (27 trees)
Large (47-59)	Cost A_1/A_2	14812.37 (84.83)	1833.59 (76.67)	7866.72 (81.18)	24512.68 (82.98)
	Cost B_1/B_2	15304.72 (87.65)	1899.42 (79.43)	8113.71 (83.73)	25317.85 (85.70)
	Cost C_1/C_2	17460.22 (100)	2391.42 (100)	9690.21 (100)	29541.85 (100)
	Cost C_3	19206.24 (110)	2630.56 (110)	10659.23 (110)	32496.03 (110)

Note: Figures in the parenthesis indicate percentages to the cost C_1/ C_2.

Table 4.17. Cost concepts – lac – very large farm.

(In rupees)

Category	Particulars	*Kusum* (13 trees)	*Palas* (11 trees)	*Ber* (26 trees)	Total (50 trees)
Very Large (60-215)	Cost A_1/A_2	17278.89 (82.53)	2658.56 (76.59)	12653.82 (82.89)	32591.27 (82.15)
	Cost B_1/B_2	17718.51 (84.63)	2752.82 (79.30)	12978.61 (85.02)	33449.94 (84.31)
	Cost C_1/C_2	20937.51 (100)	3471.32 (100)	15266.11 (100)	39674.94 (100)
	Cost C_3	23031.26 (110)	3818.45 (110)	16792.72 (110)	43642.43 (110)

Note: Figures in the parenthesis indicate percentages to the cost C_1/ C_2.

Table 4.18. Cost concepts – lac – pooled farms

(In rupees)

Category	Particulars	*Kusum* (8 trees)	*Palas* (6 trees)	*Ber* (12 trees)	Total (26 trees)
Pooled	Cost A_1/A_2	13358.68 (82.95)	1738.67 (74.46)	8003.08 (80.98)	23100.43 (81.56)
	Cost B_1/B_2	13826.87 (85.85)	1819.10 (77.90)	8246.26 (83.44)	23892.23 (84.36)
	Cost C_1/C_2	16105.37 (100)	2335.10 (100)	9882.76 (100)	28323.23 (100)
	Cost C_3	17715.91 (110)	2568.61 (110)	10871.03 (110)	31155.55 (110)

Note: Figures in the parenthesis indicate percentages to the cost C_1/ C_2.

4.3.7.6 Cost concepts – lac cultivation across the categories.

It is clear from the details furnished in the Table 4.19 that there was no leasing activity among the selected lac growers and therefore, the Cost A_1 and costA_2 and Cost B_1 and cost B_2 was same. On average, the cost C_1/C_2 of lac cultivation per 26 host tree was Rs. 28323.23. It was highest on the very large farms (Rs. 39674.94) as compared to other farms i.e small, medium, large farms indicating direct relationship with the farm size. The same trend was evident in cost A_1/A_2, cost B_1/B_2 and cost C_3.

4.3.8 Output and Returns from Lac Cultivation

The details of the physical output and gross returns of lac cultivation is presented in the Tables 4.20 to Table 4.27.

4.3.8.1 Return from phunki lac

The data in the Table 4.20 revealed the return obtained from sale of phunki lac was Rs. 2501.86, Rs. 4210.98, Rs. 6269.01, Rs. 11719.56 and Rs. 5850.37 in case of small, medium, large, very large and pooled category.

4.3.8.2 Yield of broodlac

The yield of broodlac per host tree is presented in the above Table 4.21. The yield of broodlac in case of small farms, from 4 kusum tree (*Schleichera oleosa*), 4 palas (*Butea monosperma*) and 6 ber (*Zizyphus mauritiana*) was 71.56, 10.72 and 49.08 kilogram per host tree. Therefore, making a total broodlac yield of 131.36 kilogram from all three types of host trees.

In case of medium farms, the total yield of broodlac was 219.03 kilogram from the 20 host trees comprising of 131.06, 13.94 and 74.03 kilogram from 7 kusum (*Schleichera oleosa*), 5 palas (*Butea monosperma*) and 8 ber (*Zizyphus mauritiana*) respectively.

Table 4.19. Cost concepts – lac – across the category

(In rupees)

Category	Cost A_1/A_2	Cost B_1/B_2	Cost C_1/C_2	Cost C_3
Small (0-33)	16491.23 (79.25)	17232.13 (82.81)	20809.65 (100)	22890.60 (110)
Medium (34-46)	19829.31 (80.45)	20605.25 (83.59)	24649.10 (100)	27114.28 (110)
Large (47-59)	24512.68 (82.98)	25317.85 (85.70)	29541.85 (100)	32496.03 (110)
Very large (60-215)	32591.27 (82.15)	33449.94 (84.31)	39674.94 (100)	43642.43 (110)
Pooled	23100.43 (81.56)	23892.23 (84.36)	28323.23 (100)	31155.55 (110)

Note: Figures in the parenthesis indicate percentages to the cost C_1/ C_2.

Table 4.20. Returns of phunki lac from different host trees

(In rupees)

Sl no.	Categories	Returns from phunki lac			
		Kusum	***Palas***	***Ber***	**Total**
01.	Small (0-33)	1429.28 (57.13)	91.80 (3.67)	980.78 (39.20)	2501.86 (100)
02.	Medium (34-46)	2618.49 (62.18)	113.11 (2.69)	1479.38 (35.13)	4210.98 (100)
03.	Large (47-59)	3693.76 (58.92)	131.40 (2.10)	2443.85 (38.98)	6269.01 (100)
04.	Very large (60-215)	6108.90 (52.12)	291.46 (2.49)	5319.21 (45.39)	11719.57 (100)
05.	Pooled	3316.82 (56.70)	153.30 (2.62)	2380.25 (40.68)	5850.37 (100)

Note: Figures in the parenthesis indicate percentages to the total.

Table 4.21. Yield of broodlac from different host trees

(In kg per host tree)

Sl. No.	Category	Yield of broodlac in different Host trees (kg)			
		Kusum	**Palas**	**Ber**	**Total**
01.	Small (0-33)	71.56 (54.48)	10.72 (8.16)	49.08 (37.36)	131.36 (100.00)
02.	Medium (34-46)	131.06 (59.84)	13.94 (6.36)	74.03 (33.80)	219.03 (100.00)
03.	Large (47-59)	184.88 (57.02)	17.08 (5.27)	122.29 (37.71)	324.25 (100.00)
04.	Very large (60-215)	305.77 (48.44)	34.04 (5.39)	291.43 (46.17)	631.24 (100.00)
05.	Pooled	166.00 (53.79)	18.13 (5.87)	124.44 (40.34)	308.57 (100.00)

Note: Figures in the parenthesis indicate percentages to the total.

In case of large category lac growers, the broodlac yield from 9 kusum (*Schleichera oleosa*) was 184.88 kilogram, 17.08 kilogram from 6 palas (*Butea monosperma*) and 122.29 kilogram from 11 ber trees (*Zizyphus mauritiana*). Thus, the total yield in large category lac growers from all the three types of host trees was 324.25 kilogram.

In case of very large farms, the yield from 13 kusum tree (*Schleichera oleosa*), 11 palas (*Butea monosperma*) and 26 ber (*Zizyphus mauritiana*) was 305.77, 34.04 and 291.43 kilogram which in totality makes 631.24 kilogram from all the three types of host trees.

The average yield of broodlac was 308.57 kilogram consisting of 166.00 kilogram from 8 kusum (*Schleichera oleosa*), 18.13 kilogram from 6 palas (*Butea monosperma*) and 124.44 kilogram from 12 ber (*Zizyphus mauritiana*).

The broodlac yield is increasing with the increase of the category of lac growers. Kusum tree is producing the highest amount of broodlac followed by ber and palas because of the good quality of broodlac used for inoculation and scientific method of cultivation by the lac growers.

4.3.8.3 Yield of scrapped lac

The Table 4.22 revealed the yield of scrapped lac from different host trees. In small farms the total yield of scrapped lac was 16.72 kilogram from 14 host trees consisting of 11.92, 1.53 and 3.27 kilogram from 4 kusum, 4 palas and 6 ber tress respectively.

The total yield of scrapped lac in medium category from all the three host trees was 28.75 kilogram including 21.83, 1.99 and 4.93 kilogram from 7 kusum, 5 palas and 8 ber trees respectively.

In large farm the scrapped lac yield from kusum tree was 30.79 kilogram from 9 kusum trees and 8.15 kilogram from 11 ber host trees

Table 4.22. Yield of scrapped from different host trees

(In kg per host trees)

Sl. No.	Category	Yield of scrapped lac			
		Kusum (kilogram)	**Palas (kilogram)**	**Ber (kilogram)**	**Total (kilogram)**
01.	Small (0-33)	11.92 (71.29)	1.53 (9.15)	3.27 (19.56)	16.72 (100.00)
02.	Medium (34-46)	21.83 (75.93)	1.99 (6.92)	4.93 (17.14)	28.75 (100.00)
03.	Large (47-59)	30.79 (74.83)	2.44 (8.97)	8.15 (16.19)	41.38 (100.00)
04.	Very large (60-215)	50.93 (76.71)	4.86 (8.61)	19.41 (14.68)	75.20 (100.00)
05.	Pooled	27.65 (75.55)	2.59 (9.39)	8.29 (15.06)	38.54 (100.00)

Note: Figures in the parenthesis indicate percentages to the total.

followed by 2.44 kilogram from 6 palas host trees. Therefore, the total yield of scrapped lac from all the host trees was 41.38 kilogram from 27 host trees.

For very large farm the total scrapped lac yield from entire hosts was 75.20 kilogram from 50 host trees incorporating 50.93, 4.86 and 19.41 kilogram from 13 kusum, 11 palas and 26 ber host trees respectively.

The average yield of scrapped lac was 38.53 kilogram from 26 host trees. The average scrapped lac yield from kusum was 27.65 kilogram from 8 kusum trees followed by 8.29 kilogram from 12 ber trees and 2.59 kilogram from 6 palas trees.

4.3.9 Cost and Returns of Lac Production

4.3.9.1 Cost and returns of lac production in small farms

The data presented in the Table 4.23 revealed that the returns from lac cultivation in small category lac growers were Rs. 20807.30. The returns obtained from phunki lac were Rs. 2501.86 which when deducted from the total cost, a net cost of Rs. 18305.44. The gross and net returns obtained from lac cultivation were Rs. 29835.13 and Rs. 11529.69 respectively.

4.3.9.2 Cost and returns of lac production in medium farms

It can be seen from the Table 4.24 that the total cost of cultivation in medium farms was Rs. 25185.38. The returns obtained from phunki lac was Rs. 4210.98 and a net cost of Rs. 20974.40 was obtained. The gross and net returns obtained from lac cultivation were Rs. 50068.93 and Rs. 29094.53 respectively.

4.3.9.3 Cost and returns of lac production in large farms

The Table 4.25 shows that total cost of cultivation in large farms was Rs. 29542.47. The returns obtained from sale of phunki lac was Rs. 6269.02

Table 4.23. Cost and returns of lac production on small farm

(In rupees)

Category	Particulars	*Kusum*	*Palas*	*Ber*	Total
Small (0-33)	Total cost	11735.80	1708.55	7362.95	20807.3
	Returns from phunki	1429.28	91.80	980.78	2501.86
	Net cost	10306.52	1616.75	6382.17	18305.44
	Gross returns	17286.90	1914.45	10633.78	29835.13
	Net returns	6980.38	297.70	4251.61	11529.69

Table 4.24. Cost and returns of lac production on medium farms

(In rupees)

Category	**Particulars**	***Kusum***	***Palas***	***Ber***	**total**
Medium (34-46)	Total cost	14685.78	2062.06	8437.53	25185.38
	Returns from phunki	2618.49	113.11	1479.38	4210.98
	Net cost	12067.29	1948.95	6958.15	20974.40
	Gross returns	31670.19	2359.01	16039.73	50068.93
	Net returns	19602.90	410.06	9081.58	29094.53

Table 4.25. Cost and returns of lac production on large farms

(In rupees)

Category	Particulars	*Kusum*	*Palas*	*Ber*	Total
Large (47-59)	Total cost	17450.84	2406.49	9685.14	29542.47
	Returns from phunki	3693.76	131.40	2443.86	6269.02
	Net cost	13757.08	2275.09	7241.28	23273.45
	Gross returns	44675.51	2740.47	26496.73	73912.71
	Net returns	30918.43	465.38	19255.45	50639.26

and net cost was Rs. 23273.45. The gross and net returns obtained from the lac cultivation was Rs. 73912.71 and Rs. 50639.26 respectively.

4.3.9.4 Cost and returns of lac production in very large farms

The contents of the Table 4.26 revealed that total cost of cultivation in very large farms was Rs. 39676.24. The returns obtained after selling of phunki lac was Rs. 11791.57. Net cost of Rs. 27884.65 was obtained. The gross and net returns obtained from lac cultivation were Rs. 137636.52 and Rs. 109751.87.

4.3.9.5 Cost and returns of lac production in pooled farms.

The data in the Table 4.27 presented total cost cultivation in pooled category farms was Rs. 28323.03. The returns from selling of phunki lac was Rs. 5850.37 and a net cost of Rs. 22474.66 was obtained. The gross returns and the net returns obtained from lac cultivation were Rs. 70275.33 and Rs. 47802.67respectively.

4.3.10 Measures of Farm Income in Lac cultivation

The two important elements of any business enterprise are costs and returns. The value of inputs used in the production is represented by cost and the output realized is represented by returns. The success of farm business is indicated by the relative magnitude of the costs and returns.

An important element in farm business organization relates the manner in which inputs are allocated. A measuring rod is necessary to provide guides and standards for evaluating the use of various resources. To achieve this objective, various farm efficiency measures *viz.*, farm business income, family labour income, net income, farm investment income and returns per rupee of expenditure were worked out.

Table 4.26. Cost and returns of lac production on very large farm

(In rupees)

Category	**Particulars**	***Kusum***	***Palas***	***Ber***	**Total**
Very Large (60-215)	Total cost	21013.29	3462.98	15199.97	39676.24
	Returns from phunki	6108.90	291.46	5391.21	11791.57
	Net cost	14904.39	3171.51	9808.75	27884.65
	Gross returns	73886.22	6078.47	57671.83	137636.52
	Net returns	58981.83	2906.96	47863.08	109751.87

Table 4.27. Cost and returns of lac production on pooled farms

(In rupees)

Category	**Particulars**	***Kusum***	***Palas***	***Ber***	**Total**
Pooled	Total cost	16112.28	2333.60	9877.15	28323.03
	Returns from phunki	3316.82	153.30	2380.25	5850.37
	Net cost	12795.46	2180.30	7496.90	22472.66
	Gross returns	40116.44	3197.21	26961.68	70275.33
	Net returns	27320.98	1016.91	19464.78	47802.67

4.3.10.1 Measures of farm income in lac cultivation in small farms.

The Table 4.28 shows the farm efficiency measure in case of small farms. The gross income, net income, farm business income and farm labour income for 14 host trees was Rs. 29835.13, Rs. 9025.51, Rs. 13343.90 respectively.The farm labour income for 14 host trees was Rs. 12603.01 while the farm investment income for 14 host trees was Rs. 7685.42.

4.3.10.2 Measures of farm income in lac cultivation in medium farms.

The Table 4.29 shows the farm efficiency measure in case of medium farms. The gross income, net income, farm business income and family labour income for 20 trees was Rs. 50068.93, Rs. 25213.34, Rs. 30239.62, Rs. 29463.68 respectively while the farm investment income for 20 trees was Rs. 23730.85.

4.3.10.3 Measures of farm income in lac cultivation in large farms.

The Table 4.30 shows the farm efficiency measure in case of large farms. The gross income, net income, farm business income, family labour income and farm investment income for 27 trees was Rs. 73912.71, Rs. 44370.86, Rs. 49400.03, Rs. 48594.86 and Rs. 42221.85.

4.3.10.4 Measures of farm income in lac cultivation in very large farms.

The data in the Table 4.31 shows that in very large farms the gross income, net income, farm business income, farm labour income and farm investment income for 50 trees was Rs.143105.41, Rs. 103430.47, Rs. 110514.14, Rs.109655.47 , Rs. 100321.65 respectively.

4.3.10.5 Measures of farm income in lac cultivation in pooled farms.

In case of pooled farm as presented in the Table 4.32 the gross income, net income and farm business income for 26 trees was Rs. 70275.33, Rs. 41952.10 and Rs. 47174.90 respectively. The farm labour income for 26 trees was Rs. 46383.10 while the farm investment income for 26 trees was Rs. 39911.57.

Table 4.28. Measures of farm income – lac production on small farms

(In rupees)

Category	Particulars	*Kusum*	*Palas*	*Ber*	Total
Small (0-33)	Gross income	17286.90 (100)	1914.45 (100)	10633.78 (100)	29835.13 (100)
	Farm business income	7850.12 (45.41)	697.14 (36.14)	4796.64 (45.11)	13343.90 (44.73)
	Farm labour income	7404.08 (42.83)	612.60 (31.99)	4586.33 (43.13)	12603.01 (42.24)
	Farm investment income	4822.43 (27.90)	104.95 (5.48)	2758.04 (25.94)	7685.42 (25.76)
	Net income	5550.08 (32.11)	192.60 (10.06)	3282.83 (30.87)	9025.51 (30.25)

Note: Figures in the parenthesis indicate percentages to the gross income.

Table 4.29. Measures of farm income – lac production on medium farms

(In rupees)

Category	**Particulars**	***Kusum***	***Palas***	***Ber***	**Total**
Medium (34-46)	Gross income	31670.19 (100)	2359.01 (100)	16039.73 (100)	50068.93 (100)
	Farm business income	19061.49 (60.19)	847.56 (35.93)	10330.57 (64.41)	30239.62 (60.40)
	Farm labour income	18544.80 (58.55)	767.07 (32.52)	10151.81 (63.29)	29463.68 (58.85)
	Farm investment income	15481.85 (48.88)	168.12 (7.13)	8080.88 (50.83)	23730.85 (47.40)
	Net income	16483.80 (52.05)	87.63 (3.71)	8641.91 (53.87)	25213.34 (50.36)

Note: Figures in the parenthesis indicate percentages to the gross income.

Table 4.30. Measures of farm income – lac production on large farms

(In rupees)

Category	Particulars	*Kusum*	*Palas*	*Ber*	Total
large (47-59)	Gross income	44675.51 (100)	2740.47 (100)	26496.73 (100)	73912.71 (100)
	Farm business income	29863.14 (66.84)	906.88 (33.09)	18630.01 (70.31)	49400.03 (66.84)
	Farm labour income	29370.79 (65.74)	841.05 (30.69)	18383.02 (69.39)	48594.86 (65.75)
	Farm investment income	25961.62 (58.11)	175.74 (6.41)	16084.49 (60.70)	42221.85 (57.12)
	Net income	27215.29 (60.92)	349.05 (12.74)	16806.52 (63.43)	44370.86 (60.03)

Note: Figures in the parenthesis indicate percentages to the gross income.

Table 4.31. Measures of farm income – lac production on very large farms

(In rupees)

category	Particulars	*Kusum*	*Palas*	*Ber*	Total
Very Large (60-215)	Gross income	73886.22 (100)	6078.47 (100)	63140.72 (100)	143105.41 (100)
	Farm business income	56607.33 (76.16)	3419.91 (56.26)	50486.90 (79.96)	110514.14 (77.23)
	Farm labour income	56167.71 (76.01)	3325.65 (54.71)	50162.11 (79.44)	109655.47 (76.62)
	Farm investment income	51294.58 (69.42)	2354.28 (38.73)	46672.79 (73.91)	100321.65 (70.10)
	Net income	52948.71 (71.66)	2607.15 (42.89)	47874.61 (75.82)	103430.47 (72.28)

Note: Figures in the parenthesis indicate percentages to the gross income.

Table 4.32. Measures of farm income – lac production on pooled farms

(In rupees)

Category	Particulars	*Kusum*	*Palas*	*Ber*	Total
Pooled	Gross income	40116.44 (100)	3197.21 (100)	26961.68 (100)	70275.33 (100)
	Farm business income	26757.76 (66.70)	1458.54 (45.62)	18958.60 (70.32)	47174.90 (67.13)
	Farm labour income	26289.57 (65.33)	1378.11 (43.10)	18715.42 (69.41)	46383.10 (66.00)
	Farm investment income	22868.72 (57.00)	709.03 (22.18)	16333.82 (60.58)	39911.57 (56.79)
	Net income	24011.07 (59.85)	862.11 (26.96)	17078.92 (63.35)	41952.10 (59.70)

Note: Figures in the parenthesis indicate percentages to the gross income.

4.3.10.6 Measures of farm income in lac cultivation across the categories of lac growers.

The Table 4.33 and Figure 4.5 give an overview of the farm efficiency of different categories of lac growers. This analysis indicates that gross income, net income, family labour income, farm investment income shows direct relationship with increase in the number of trees utilized for lac cultivation. This showed that the very large category lac growers realized more returns than small, medium and large category lac growers for their fixed resources, family labour use and expenditure in the cultivation of lac. This also revealed that the highest returns were obtained from kusum as compared to palas and ber. The result obtained was in accordance with the results of Pal, Govind (2009) and Pal *et al*. (2009).

4.4 MARKETING ASPECTS OF LAC

In dynamic and growing economy, the agricultural marketing system provides important linkages between the farm production sector and non-farm sector. Marketing is as critical for better performance in agriculture as farming itself. Apart from performing physical and facilitating functions of transferring the goods from the producers to consumers, the marketing system also performs the functions of discovering the prices at different stages of marketing and transmitting the price signals in the marketing chain. An efficient marketing system guarantees the farmers better price for farm products and induces them invest their surpluses in the purchase of modern inputs so that productivity and production may increase. If the producer does not have an easily accessible market outlet where he can sell his produce, he has little incentive to produce more. The need for providing adequate incentive for increased production is therefore important and this can be made possible only by streamlining the market system.

From the study, it was found that mostly private agencies such as Village merchants (Paikars), wholesalers, were involved in the marketing of

Table 4.33. Farm efficiency measures – lac production across the categories

(In rupees)

Category	Gross income	Net income	Farm business income	Farm labour income	Farm investment income
Small (0-33)	29835.13 (100)	9025.51 (30.25)	13343.90 (44.73)	12603.01 (42.24)	7685.42 (25.75)
Medium (34-46)	50068.93 (100)	25213.34 (50.36)	30239.62 (60.40)	29463.68 (58.85)	23730.85 (47.40)
Large (47-59)	73912.71 (100)	44370.86 (60.03)	49400.03 (66.84)	48594.86 (65.75)	42221.85 (57.12)
Very large (60-215)	143105.41 (100)	48594.86 (72.28)	110514.14 (77.23)	109655.47 (76.62)	100321.65 (70.10)
Pooled	70275.33 (100)	41952.10 (59.70)	47174.90 (67.13)	46383.10 (66.00)	39911.57 (56.79)

Note: Figures in the parenthesis indicate percentages to the gross income.

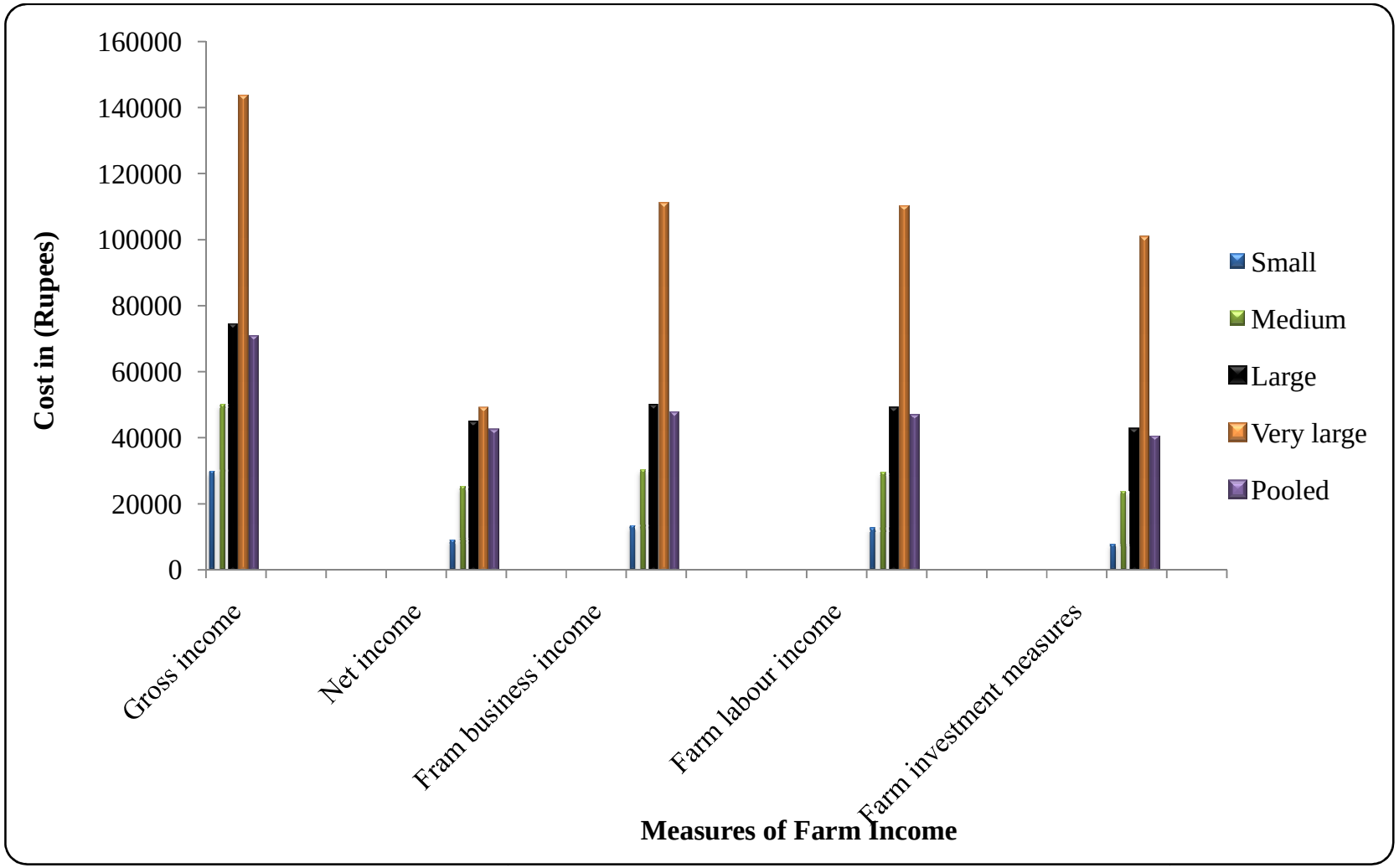

Fig. 4.5. Measures of Farm Income in Lac cultivation across the categories of lac growers.

lac in the study area. An attempt was made to study and analyze the market structure, marketing costs and price spread in the marketing of lac in the study area.

4.5.1 Marketing Channels

Marketing channels are the alternative routes of product – flows from producers to consumers. In Ranchi district more than 95 per cent of the lac is marketed as scrapped lac. Therefore, present study focused its attention on the marketing aspects of scrapped lac. In the study area for marketing of scrapped lac and phunki lac only one marketing channel was found which was:

Channel

Producer➤Village merchant (Paikars) ➤ Town merchant (Wholesaler) ➤ Processor

4.5.2 Marketing Costs

The marketing cost is the sum total of all costs incurred in the movement of produce and includes such costs as loading and unloading, transportation, and storage and losses due to storage etc. The costs incurred by producer seller and the intermediaries in handling lac were worked out and presented in Table 4.34.

In the marketing of lac, producer did not incur any expenditure towards marketing of lac because the village merchant purchased the product from the producer from the production centre itself and thus saved marketing expenses.

In the present channel the village merchant (Paikar) incurred a cost of Rs. 183 per quintal of lac towards selling. Among the costs incurred by the village merchant were transportation, loading and unloading and storage and losses charge were the major components.

Table 4.34. Marketing cost of lac incurred by the paikar

Sl. No.	Particulars	Amount in rupees (per quintal)	Per cent of total cost
1.	Loading and unloading	51	27.87
2.	Storage and losses	12	6.56
3.	Transportation	120	65.57
	Total cost	183	100

A close perusal of Table 4.35 reveals marketing cost incurred by the wholesaler towards selling. On an average, the wholesaler incurred a cost of Rs. 501 towards the marketing of a quintal of lac. Transportation followed by the storage and losses were the major cost component at this level contributing nearly 70 per cent of the total cost incurred.

4.5.3 Marketing Costs, Margins and Price Spread

The marketing functionaries move the commodities from the producers to the consumers. Every service or function involves cost. The intermediaries make some profit to remain in the trade after meeting the cost of function performed.

In the marketing of farm commodities, the difference between the prices paid by the consumer, the price received by the producer for an equivalent quantity of farm produce is known as price spread. The magnitude of marketing margin relative to the price of the product indicates the efficiency of marketing system. Studies on marketing margins and costs are important as they reveal the costs incurred by each agency in the channels and the share of each agency in the total cost. This knowledge ultimately helps us to identify the reasons for high marketing costs and the possible ways of reducing them. Marketing costs and margins of the marketing channels identified in the study area were worked out to assess the share of different functionaries involved and ultimately the producer's share in consumer's rupee (Table 4.36 and Figure 4.6).

The producer's share in consumer's rupee in the channel was 81.76 per cent. The price spread was lower in marketing channel as nearly 18.24 per cent of consumer rupee was shared by marketing intermediaries.

The producer had not incurred any selling cost in the channels for marketing of lac as they sell their produce either to paikars (village merchant) in village or nearby markets. Hence, the purchase price of the

Table 4.35. Marketing cost incurred by wholesaler

Sl. No.	Particulars	Amount in rupees (per quintal)	Per cent of total cost
1.	Loading and unloading	64	12.77
2.	Storage and losses	86	17.17
3.	Transportation	351	70.06
	Total cost	501	100

Table 4.36. Price spread in lac marketing

Sl no.	Particulars	Amount in rupees (per quintal per annum)	Per cent of the total cost
1.	Producer's selling price	17660	81.76
	a. Marketing cost	-	
	b. Net price	17660	81.76
2.	Paikars		
	a. Purchase price	17660	81.76
	b. Marketing cost	183	0.84
	c. Margin	807	3.74
3.	Town merchant		
	a. Purchase price	18650	86.34
	b. Marketing cost	501	2.32
	c.Margin	2449	11.33
4.	Processor		
	a. purchase price	21600	100

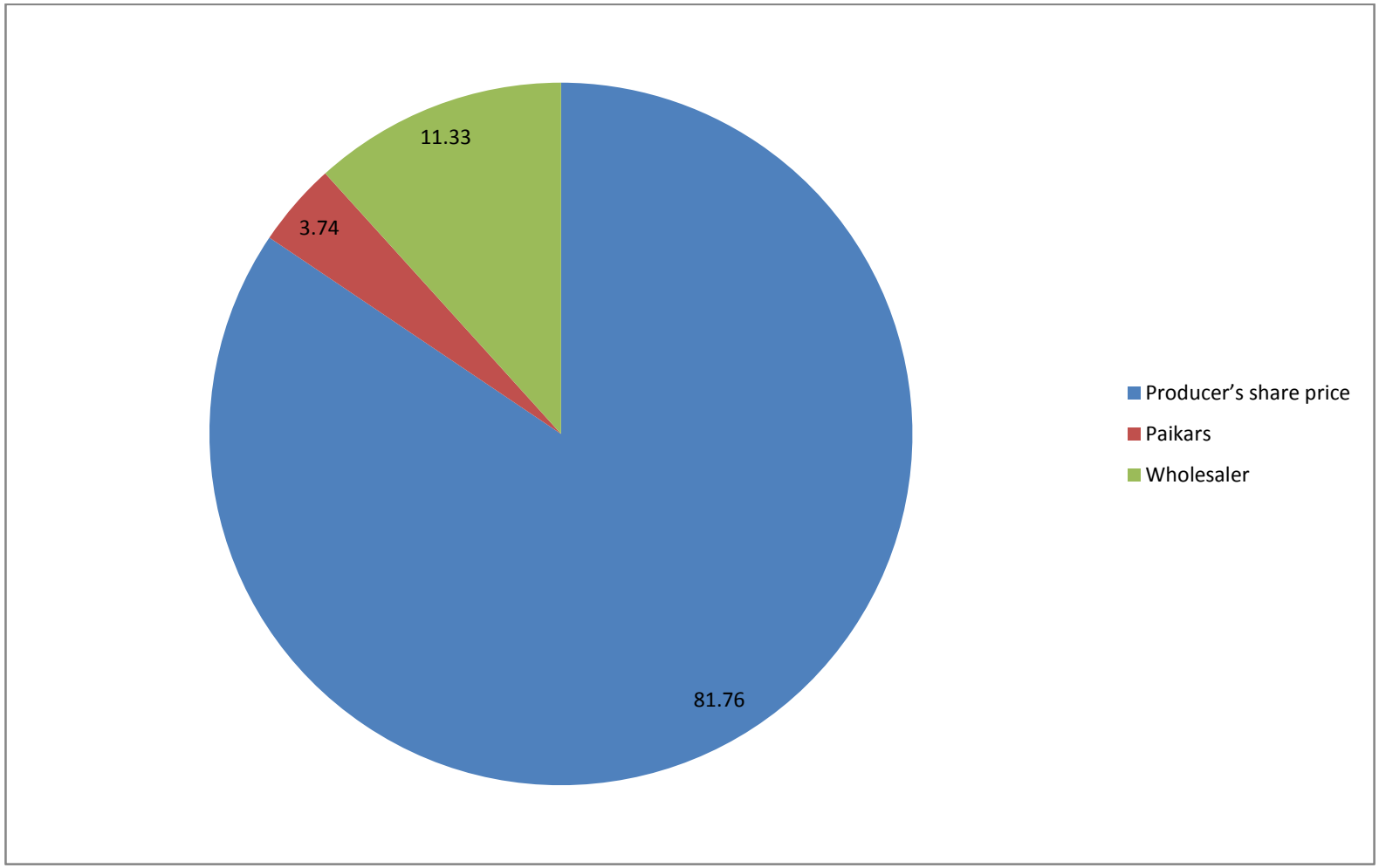

Fig. 4.6. Price spread in lac marketing

village merchant in present channel was nothing but the net price received by the producer.

In the present channel the producer seller sold the product to the village merchant and received a net price of Rs. 17600 per quintal.

The village merchant incurred a cost of Rs. 183 towards marketing a quintal of lac in present channel. He got a margin of Rs. 807 per quintal accounting for 3.74 per cent of consumer's rupee.

The town merchant (wholesaler) incurred a cost of Rs. 501 towards marketing cost a quintal of lac in lac marketing channel and he got a higher margin of Rs. 2449, accounting about 11.33 per cent of the consumer's rupee.

The analysis of marketing cost and marketing margin in the present marketing channel of lac revealed that the producer was getting higher share of consumer's rupee. The wholesaler realized higher profits as compared to the village merchant. From the study it was revealed that there was no organized market structure for lac in the study area. The above results call for a well organized marketing system in Ranchi district. This result obtained commensurate with result obtained by Pal *et al*. (2013) and Pal *et al*. (2014).

4.5 PROCESSING ASPECTS OF LAC

Processing refers to the value addition to the commodity. In the process, it reduces perishability of the product, increases its shelf life and makes the product available to recover valuable by products and yields better returns to the processor.

The lac processing industry may be categorized mainly in two categories namely primary processing and secondary processing. In primary processing sticklac is converted into the semi - refined product called

seedlac through series of operation like crushing, washing, drying, winnowing and grading. Lac in this form is used for production of different types of lac products like shellac, bleached lac and other value added products through secondary processing. The basic raw material of this industry is sticklac. It is collected either as ari (immature lac) or phunki (used up broodlac) from lac host trees. The process of manufacturing the seedlac involves five major operations *i.e.* sieving, crushing, washing, drying, winnowing and grading.

Sieving: The stick lac received by the factories is in the form of clods which is difficult to be processed in the small processing industry. Therefore, dried sticklac is passed through the coarse (8-12 mesh) and fine (30-40 mesh) wire mesh to separate the big lumps and the fine dust. The clods that are bigger in size are used for making the seedlac and the material passing through lower sieve(30-40 mesh) is washed for obtaining fine lac dust.

Crushing: The clods bigger than the top mesh size (8-12 mesh) undergoes crushing. Hand operated or power operated crusher are used for crushing the clods.

Washing: The crushed and sieved lac undergoes washing to get free from water soluble dyes, sugar, insect bodies, woody matter and uncrushed lac cells. It can be done manually and mechanically with soft and iron free water and also with the help of washing soda. The washing is mainly carried out with the help of washing barrel.

Drying: The washed grains of lac are dried by spreading it on the cemented courtyard. The wet seedlac is spread in very thin layers and are turned over from time to time with a wooden rake and hoe.

Winnowing: The dried seedlac is winnowed to separate out the particles out the particles of sand, wood which were not removed during washing.

Grading: After winnowing the seedlac is separated according to various sizes and taken into the blending room where different grades (sizes) are mixed in different proportions to make various commercial grades. Molamma and patti are obtained in the process which are sold separately. The mud obtained after washing are used as a bio fertilizer in paddy fields by the farmers. Therefore, the processing sector of lac is zero waste or residue sector.

4.5.1 Investment Pattern

Setting up a lac processing unit involves considerable amount of investment. In the case of these units the major investment items are building and machinery. A detailed regarding the amount of investment made by all selected lac processing units is presented in the Table 4.37.

As could be seen in the Table 4.37, the total investment made by the sampled lac processor amounted to Rs. 8,50,000 of which Rs. 2,00,000 was spent on buildings and Rs. 6,50,000 was incurred on machinery with their respective shares being 23.53 per cent and 76.47 per cent of the total investment.

4.5.2 Costs

All the cost incurred by the processor from the point of procurement of raw materials till the produce is bought to the marketable condition are grouped under three broad heads *viz.*, fixed cost, variable cost and marketing cost, which together constitutes the processing cost.

Processing cost of lac processing unit was worked out and presented in the Table 4.38 and Figure 4.7. It was evident from the Table 4.38 that the

Table 4.37. Investment on building and machinery

Sl. No.	Particulars	Value (Rs.)
1.	Investment on building	2,00,000
2.	Investment on machinery	6,50,000
3.	Total investment	8,50,000
4.	Investment on building per ton	266.67
5.	Investment on machinery per ton	866.67
6.	Total fixed investment per ton	1133.34

Table 4.38. Cost and returns of lac processing industries.

Sl. No.	Particulars	Value (Rupees per ton per day)
A.	**Variable cost**	
1.	Scrapped lac	118356.16
2.	Labour	986.30
3.	Caustic soda	136.93
4.	Markeen cloth	684.93
5.	Interest on working capital	18846.58
	Total variable cost	139010.90
B.	**Fixed cost**	
1.	Depreciation	35.67
2.	Water source	8.22
3.	Electricity	98.63
4.	Interest on fixed capital	145.21
	Total fixed cost	287.73
C.	Cost of production	139298.69
D.	**Marketing cost**	**3041.10**
E.	**Total cost**	**142339.79**
F.	Gross return	146356.16
G.	Net return	4016.37
H.	Return per rupee of investment	1.03

total cost incurred to produce one ton of seedlac was Rs.142339.79, of which variable cost amounted to Rs. 139010.90 which accounted for 97.66 per cent of the total cost. The fixed cost amounted to Rs. 287.73 accounting for 0.20 per cent of the total costs. The marketing cost amounted to Rs. 3041.10 accounting for 2.14 per cent of the total costs further Table 4.38 also indicated that the major share of the variable cost was incurred on purchase of raw material which alone accounted to Rs. 118356.16 per tonne sharing about 83.15 per cent of the total cost. The raw material was usually the major cost component in agro- industries and procurement operation were found to shape the economics of enterprise (Nicholas Wallis, 1993). This followed by the expenditure incurred on interest on working capital which amounted to Rs. 18846.58 per tonne.

Fixed cost amounted to Rs. 287.73 per tonne contributing 0.20 per cent to the total cost. Among the fixed costs, the highest share was of interest on the fixed assets which accounted for major cost amounting to Rs. 145.21 sharing about 0.10 per cent of the total cost). The other important components were depreciation, electricity and water charges.

Marketing cost includes the transportation cost, grading and testing, storage and packaging. The processor while buyng the sticklac follow chauri partha method which is basically to know the value of one maund of stick lac based on yield of seedlac per maund of stick lac. For this stick lac undergoes various testing procedures.

4.5.3 Returns

To assess the profitability of the unit, knowledge about the gross returns obtained from the units apart from the information on cost of processing is essential in order to arrive at net returns from the lac processing units and the same is being presented in the Table 4.38.

The gross return obtained from the lac processing unit includes return obtained from selling of seedlac, molamma, patti, bleached cake and kuhni which amounted to Rs. 146356.16 the net return obtained from the lac processing unit was Rs. 4016.37.Thus, the analysis on cost and returns reveals that the lac processing unit was running successfully on the profitable lines.

4.5.4 Break - Even Analysis of the Processing Units:

The profitability of the selected processing units was studied with the help of a management tool known as break- even analysis. This tool indicates whether the processing units are operating in the profit zone or loss zone. This type of analysis helps the owners of the processing units to make production decisions. It also helps them to plan under changing situations of factor and product prices. At break even output, processing unit gets neither profit nor loss. The break even output indicates minimum quantity of output that has to be processed so as to continue in the business without incurring the losses.

Therefore, this tool of analysis has been applied to the lac processing units to locate the break - even point and the margin of safety.

The break even analysis worked out for the lac processing unit has been presented in the Table 4.39.

The result of analysis indicated that there break even output was 60.66 tonnes. The margin of safety was 54.34 tonnes. The more the production moves beyond the break even more would be the profitability. Therefore utilization of lac processing unit was encouraged.

4.5.5 Business Ratio

Business ratio indicates the efficiency, profitability and the viability of the processing units.

Table 4.39. Breakeven output in seed lac production

Sl .no.	Particulars	Value
1.	Fixed cost	445600
2.	Variable cost per unit(tonnes)	139010.90
3.	Price per unit(tonnes)	146356.16
4.	Break even output (tonnes)	60.66
5.	Actual production (tonnes)	115
6.	Margin of safety (tonnes)	54.34

4.5.5.1. Total assets turnover

It was observed from the Table 4.40, that total assets turnover of lac processing units was 1.07. The performance of these processing units was good because of the better marketing of output, higher recovery performance and better utilization of their unit capacity.

4.5.5.2. Return on assets

It was observed from the Table 4.40 that it generated 3.54 rupees on each rupee of investment made on assets as net income.

4.5.5.3. Return per Rs. 1000 of working cost

It was observed from the table 4.40, that the returns from the working cost was Rs.1030.30 for every 1000 rupees of the working costs invested.

4.5.5.4. Net profit margin

The net profit margin for the lac processing unit was 2.74 per cent of the sales. This meant that, for every Rs. 100 sales, the net profit was Rs. 2.74 in the lac processing unit.

4.5.5.5. Capital turnover

Capital turnover was observed to be Rs. 1.02 in lac processing unit. This means that the lac processing unit generated Rs.1.02 on each rupee on its total investment in the production process.

4.5.5.6. Return on capital employed

It was observed from the Table 4.40 that lac processing unit was able to generate 3 paise as net income on each rupee of investment.

Table 4.40.Business ratio analysis of lac processing industries

Sl. No.	Particulars	Value
1.	Total asset turnover	1.07
2.	Return on asset	3.54
3.	Return per 1000 of working cost	1030.30
4.	Net profit margin (%)	2.74
5.	Capital turnover	1.02
6.	Return on capital employed	0.03
8.	Return per rupee of investment	1.03

4.5.5.7. Return on per rupee of investment

It was observed from the Table 4.40 that return per rupee of investment was 1.03.

4.6 CONSTRAINTS IN THE PRODUCTION AND MARKETING OF LAC

The constraints faced by the respondents in the production and marketing of lac are presented in Table 4.41.

The constraints faced by lac growers in the lac production were categorized into five categories namely production issues, marketing issues, infrastructural issues, biotic issues, and institutional issues. The shortage of broodlac under production issues was major constraint faced by lac growers followed by dearth of the capital which comes under infrastructural issues as reported by 72.41 per cent of the lac growers. Lack of market information under the marketing issues was ranked as the third constraints influencing lac cultivation as reported by 54.56 per cent of the lac growers. The biotic factors that includes damage due to predators, dying of lac infested shoots and damage due to rain in summer were the fourth, fifth and sixth important constraint in lac production which were reported by 53.17, 50.93 and 38.28 per cent of the lac growers. The seventh and eighth constraints influencing lac production was inaccessibility of equipments in rural areas which comes under infrastructural issues and lack of scientific knowledge and training that comes under institutional issues were recorded by 31.72 and 24.84 per cent of the lac growers.

Issues related to marketing of lac were studied. Market price fluctuation was the major issue reported by 13.90 per cent of respondents followed by inadequate storage facilities which was accounted by 10.49 per cent of respondents.

Table 4.41.Consraints faced during production and marketing of lac.

Sl no.	Category	Problems	Score	Rank
1	**Production issues**	Shortage of broodlac	76.09	1
2	**Infrastructural issues**	Dearth of capital	72.41	2
3	**Marketing issues**	Lack of market information	54.56	3
4	**Biotic factors**	Damage due to predators.	53.17	4
		Dying of lac infested shoots	50.93	5
		Damage due to rain in summer	38.28	6
5	**Infrastructutal issues**	Inaccessibility of equipments in rural areas.	31.72	7
6	**Institutional issues**	Lack of scientific knowledge and trainning	24.84	8
7	**Marketing Problems**	Price fluctuation	13.9	9
		Inadequate storage facilities	10.49	10

The following measures were suggested by the sample farmers to overcome the production and marketing constraints.

- Government should take initiatives to establish regulated markets for lac in order to check malpractices of private traders.
- Government should also make provisions for cheap financial services to promote lac cultivation.
- The number of trees used for lac cultivation should increase.
- Government should take initiative to make the equipments easily accessible to the lac growers.
- Government can offer storage facilities to the farmers by building godowns where the farmers will store sticklac immediately after harvesting.

Chapter ~ V

Summary & Conclusions

Chapter – V

SUMMARY AND CONCLUSIONS

The lac cultivation for many years has formed the means of livelihood of thousands of poor households of India, especially those inhabiting the forest and other areas where the lac insects abound. These areas are mainly characterized by lack of the resources, untimely rainfall and lack of fertile lands for cultivation. In this scenario of tribal life, lac comes in rescue of their livelihood. The hosts used for lac cultivation by these tribals are mainly found in their surrounding which helps them to get a sustainable income round the year. Cultivation of lac is mainly exploited for its product of commerce *viz*., resin, wax and scrapped lac. It not only provides source of livelihoods to the millions of tribal people, earns a great foreign exchange but is also a source of socio - economic upliftment. Jharkhand is gifted to have abundant natural resources which form a hub of many hosts trees used for lac cultivation. Besides requirement of skills and time is very less for lac cultivation which makes it easy for the uneducated tribal people to carry out its operation. Lac a resinous secretion of the tiny lac inset i.e *Kerria lacca* surviving on the host trees like palas *(Butea monosperma),* kusum *(Schleichera oleosa)* and ber *(Ziziphus mauritiana).*

India is the largest producer, processor and exporter of lac followed by Thailand, Indonesia, parts of China *etc*. The quantity of export has been increased by 87 per cent from the previous year indicating expansion of lac in the world market. In India, Jharkhand state ranks first followed by Madhya Pradesh, Chhattisgarh, Maharashtra and Odisha. These five states contribute around 93 per cent of the national lac production. Jharkhand stands first with an average production of 8630 tonnes of lac.

The present study entitled “Economic analysis of production and marketing of lac in Ranchi district of Jharkhand” was intended to examine cost and returns, price spread and cost and returns for processing industries of lac.

5.1 THE OBJECTIVE OF THE STUDY

1. To study the cost and returns structure in production of lac.
2. To study the marketing aspects of lac.
3. To compute the cost and returns of processing of lac.
4. To study the constraints faced by lac farmers and marketing agencies.

The study was carried out in Ranchi district of Jharkhand. Based on the dominance of the area and production under lac cultivation in the district, three blocks namely Namkum, Angara and Bundu were selected. Two villages from each block were chosen. The list of all the growers of lac from the two selected villages of each mandal was obtained and the farmers were stratified into four size groups depending on the number of trees owned by th lac growers *viz;* small (owning 0-33 host trees), medium (owning 34 – 46 host trees), large (owning 47-59 host trees) and very large (owning 60-215 host trees). From each selected village, 15 farmers in each size group were selected at random. Altogether 90 farmers were selected for detailed study. The required data were collected from the selected lac growers through personal interviews with the help of the well structured schedule for the agricultural year 2015-16. The data were analyzed by using conventional analysis to fulfill the objectives of the study.

5.2 MAJOR FINDINGS OF THE STUDY

The average size of the family was 5.00, 4.50, 4.80, 5.32 and 4.86 members in the case of small, medium, large, very large and pooled farms respectively.

The average size of the land holding varied from 2.30 hectares on the small farms followed by the 3.19 hectares on medium farms, 3.85 hectare on large farms to 5.15 hectares of the very large farms, with an overall average of 3.54 hectares. There was a predominance of dryland cultivation as percentage of dry land was more compared to the irrigated land.

The educational status was 66.67 per cent, 76.67 per cent, 80.00 per cent, 84.22 per cent and 76.67 per cent in case of small, medium, large, very large and pooled farms respectively. Literacy rate was highest in very large farms with 26.31 per cent of lac growers having the qualification of Intermediate.

The lac growers followed coupe system of lac cultivation as they use a part of the total number of trees available to them with an average host utilization of 54.16 per cent. In case of small farms, 14 (48.27%) out of the 29 available host trees were used, in case of medium farms lac growers used 20 host trees (51.28 %), 27 trees (52.94 %) out of the 51 available trees were utilized by large farms and lastly very large farms utilized about 50 trees (62.50 %) out of the 80 available host trees.

The total human labour utilized was 42.79, 47.69, 50.55, 69.29 and 51.69 mandays on small, medium, large, very large and pooled farms respectively. The major labour absorbing operations were inoculation of broodlac (22.44 %), harvesting of broodlac (22.30 %), phunki removal (11.65 %), harvesting of ari lac (11.24 %), scrapping of phunki (10.29 %) insecticidal spray (9.50 %), pruning (7.76 %) and bagging (4.82 %).

The human labour utilization per lac host tree varies from 9.39 in case of small farms, followed by 6.82 in medium farms, 5.57 in case of large farms to 4.6 in very large farms with an average of 5.93 mandays per tree. The major labour absorbing host was kusum followed by ber and then palas.

The inoculation of the host trees needed about 8.07, 7.59, 7.46, 6.41 and 7.19 kilogram of broodlac per tree in case of small, medium, large, very large and pooled farms respectively. In kusum major amount of broodlac was required for inoculation.

On an average, the cost of cultivation of lac for 26 host trees on pooled farms worked out to Rs.28323.03. The cost of cultivation was directly related with the size of the holding. It was Rs.20807.30 for 14 host trees, Rs. 25185.38 for 20 host trees, Rs. 29542.47 for 27 host trees and Rs. 39676.24 for 50 host trees on small, medium, large and very large farms.

The cost of human labour, broodlac and plant protection chemicals accounted for more than 75 percent of the total costs.

On average, the cost C_1/C_2 of lac cultivation for 26 host trees was Rs. 28323.23. It was highest on the very large farms (Rs. 39674.94) as compared to other farms i.e small, medium, large farms indicating direct relationship with the farm size. The same trend was evident in cost A_1/A_2, cost B_1/B_2 and cost C_3.

The return obtained from sale of phunki lac was Rs. 2501.86, Rs. 4210.98, Rs. 6269.01, Rs. 11719.56 and Rs. 5850.37 in case of small, medium, large, very large and pooled category.

The yield of broodlac varies from 28.77, 30.77, 34.51, 37.82 to 34.17 kilogram per tree in small, medium, large, very large and pooled farms indicating the direct relationship with increase size of farm. The yield of broodlac was highest from kusum followed by ber and palas.

The yield of scrapped lac varies from 3.91, 4.14, 4.57, 5.11 to 4.58 kilogram per tree in small, medium, large, very large and pooled farm respectively indicating the direct relationship with increase size of farm. The yield of broodlac was highest from kusum followed by ber and palas.

The cost of producing lac exhibited direct relationship with the size of the holding as it was Rs. 39676.24 for 50 host trees on very large farms, Rs. 29542.47 for 27 host trees on large farms, Rs.25185.38 for 20 host trees on medium farms and Rs. 20807.30 for 14 host trees on small farms. Lac production yielded a net return of Rs.11529.69 from 14 host trees, Rs.29094.53 from 20 host trees, Rs.50639.26 from 27 host trees, Rs.109751.87 from 50 host trees and Rs. 47802.67 from 26 host trees on small, medium, large, very large and pooled farms respectively.

The farm business analysis revealed that the gross income, net income, farm business income and farm investment income showed direct relationship with the size of the farm in the cultivation of lac. The gross income ranged from Rs. 29835.13 from 14 host trees, Rs. 50068.93 from 20 host trees, Rs. 73912.71 from 27 host trees to Rs.143105.41 from 50 host trees on small, medium, large and very large farms in the cultivation of lac with an average of Rs. 70275.33 from 26 host trees.

The net income increased from Rs. 9025.51 from 14 host trees on small farms, Rs. 25213.34 from 20 host trees on medium farms, Rs. 44370.86 from 27 host trees on large farms and Rs. 103430.47 from 50 host trees on very large farms with overall average of Rs. 41952.10 from 26 host trees on pooled farms.

In the marketing of lac only one channel were identified. They were, producer ➤ village merchant (Paikar) ➤ town merchant (wholesaler) ➤ Processor. The analysis of marketing costs and margins revealed that the producer was getting a share of consumer’s rupee of about 81.76 per cent.

The total investment made by the lac processor amounted to Rs.8,50,000 of which Rs.2,00,000 was spent on buildings and Rs.6,50,000 was incurred on machiney with their respective shares being 23.53 per cent and 76.47 per cent of the total investment.

The total cost incurred to produce one tonne of seedlac was Rs.142339.79 consisting of variable cost amounting to Rs. 139010.90, fixed cost Rs.287.73 and marketing cost of Rs. 3041.10 sharing about 97.66 per cent, 0.20 per cent and 2.14 per cent respectively.

Among the variable cost, cost of raw materials was the major cost accounting nearly 83.15 per cent followed by the interest on working capital. The major share in fixed cost was of interest on fixed assets which accounted for 50.46 per cent of the total fixed cost.

Marketing cost includes the transportation cost, grading and testing, storage and packaging. The processor while buyng the sticklac follow chauri partha method which is basically to know the value of one maund of stick lac based on yield of seedlac per maund of stick lac. For this stick lac undergoes various testing procedures.

The gross return obtained from the lac processing unit amounted to Rs. 146356.16 and the net return obtained from the lac processing unit was Rs. 4016.37.

The break even output was 60.66 tonnes which was less than actual quantity of production and the margin of safety was 54.34 tonnes.

The total assets turnover of lac processing units was 1.07 which shows the better performance of lac processing industry.

The return on assets was 3.54 showing that it could generate 3.54 rupees on each rupee of investment made on assets as net income.

The return per Rs.1000 of working cost was Rs. 1030.30 which shows that the returns from the working cost was Rs.1030.30 for every 1000 rupees of the working costs invested.

The net profit margin for the lac processing unit was 2.74 per cent of the sales which means that for every Rs. 100 sales, the net profit was Rs. 2.74 in lac processing unit.

Capital turnover was observed to be Rs. 1.02 in lac processing unit which infers that the lac processing unit generated Rs.1.02 on each rupee on its total investment in the production process.

The return on capital employed was 0.03 which can be interpreted as lac processing unit was able to generate 3 paise as net income on each rupee of investment.

5.3 CONCLUSIONS

- The existed a positive relationship between the number of trees available and the categories of lac growers.
- The size of the family is more or less constant with respect to the farm size.
- Sample farmers exhibited positive relationship between the average size of land holding and the farm size.
- The literacy status of the farmers exhibit a direct relationship with the farm size.
- The host utilization percentage of different hosts increases with the increase of the farm size.
- The total human labour use was more on small farms as compared to medium, large and very large indicating inverse relationship with the size of the farm. The major labour absorbing operations were inoculation of broodlac, harvesting of broodlac, phunki removal, harvesting of ari lac, scrapping of phunki, insecticidal spray, pruning and bagging. The major labour absorbing host tree was kusum followed by ber and then palas.

- The amount of broodlac used shows a negative trend with the increase in the farm size. The prime amount of the broodlac was used in kusum followed by ber and palas.
- The cost of cultivation showed direct relationship with the size of the holding and was highest for kusum, subsequently for ber and palas.
- The yield of broodlac, scrapped lac and phunki lac shows a positive relationship with the farm size.
- The cost of production was directly related with the farm size.
- All the measures of income were directly related with the size of farm.
- The lac cultivators realized more than 80 per cent of the consumer's rupee.
- The analysis on cost and returns reveals that the lac processing unit was running successfully on the profitable lines.
- The break even analysis showed that the processing units are utilizing available resources efficiently.
- The business ratio indicated that the lac processing unit was profitable and viable.
- Shortage of broodlac, dearth of capital, lack of market information, damage due to predators and dying of lac infested shoots, price fluctuation were the major the major constraints in lac production and marketing.

5.4 POLICY IMPLICATIONS

- The result of host utilization percentage suggested an increase in the utilization percentage by providing training of scientific lac cultivation to the farmers. Government should take initiative to provide the required training as well as the equipments to the farmers.
- The annual net profit earned in lac cultivation was highly encouraging and offers large scope to increase the area under lac. This requires

intensified extension activities such as trainings, demonstrations among farmers by State Department.

- The study revealed that the producer's share in consumer's rupee was more than 80 per cent and profitability of the lac growers in the marketing of lac can be increased by group marketing, co-operative marketing.
- From the study it was found that lack of market information was one of the problems faced by the farmers in the study area. Therefore, government should improve the market extension network for easy dissemination of price prevailing in the market.
- Majority of farmers reported as the shortage of broodlac was the major problem in lac cultivation which can be due to several reasons like abiotic and biotic factors, immature harvesting of lac crop, inefficient host utilization. Therefore, to overcome this problem, scientific method of lac cultivation should be promoted besides strengthening the extension system for imparting knowledge about the brood preserver host tree like *Ficus* species. Government should supply free and sufficient quatity of broodlac.
- Inadequate credit facility was another problem faced by the farmers in the study area. Therefore government should provide financial support to lac growers through financial institutions.
- The study also revealed poor marketing facilities for lac which can be rectified by strengthening of infrastructure and developing other support facilities which will be effective for monitoring of location, situation and system based technologies.

Literature Cited

LITERATURE CITED

Anonymous (2010). *Livelihood promotion through Non-Timber Forest Produces (NTFPs) in West Singhbhum*, Jharkhand State Livelihood Promotion Society (JSLPS), Rural Development Department, Ranchi (Jharkhand) India.

Alex, A. and Vidyasagaran, K. 2016. The marketing of non- timber forest products in the Western ghats region of Attappady, Kerala. *Economic Affairs*. 6(3):1-9.

Alibaba, Md and Subba Rao, D.V. 2005. Marketing of minor forest produce in Adilabad district of Andhra Pradesh. *The Andhra Agricultural Journal*. 52(1): 232-237.

Banerjee, S. and Shrivastava, S.L. 2014. Economic analysis of cashew nut processing in India. *Economic affairs*. 59(3): 429-437

Barman, J.C., Rahman, M.M., Pramanik, M.E., Alam, M.A. and Uddin, N.Z. 2007. Effect of lac cultivaton on the yield of jujube of different ber (*Zizyphus jujube*) varieties. *Journal of Subtropical Agricultural Research and Development.* 5(3): 286-290.

Bhatia, N. K and Mohammad Yousuf. 2013. Forest insect industry in collaborative forest management: An Overview. *International journal of Industrial Entomology*. 27(1): 166-179.

Chavan, S.B., Uthappa, A.R., Sridhar, K.B., Keerthika, A., Handa, A.K.,Newaj, R., kumar, N., Kumar, D and Chaturvedi, O.P. 2016. Trees for life: creating sustainable livelihood in Bundelkhand region of Central India. *Current Science*. 6:111-114.

Das, P and Singh, P. K. 2014. Munda and their lac culture case study of Gullu area of murhu block in Khunti district, Ranchi, Jharkhand. *Asian Mirror- International Journal of Research*. 1(1):1-22.

Dovie, D. B. K. 2003. Rural economy and livelihoods from the non-timber forest products trade: Compromising sustainability in southern Africa. *International Journal of Susainable Development & World Ecology*. 10: 247-262.

Dwivedi, R., Shrivastav, K.K and Pal Govind. 2016. Socio - economic profile of lac growers in Bastar district of Chhattisgarh, India. *Indian Forester*. 142(4): 336-340.

Gupta, A.K., Sharma, M.L., Khan, M.A., Narbaria, S and Pandey. A. 2015. Problems faced by tribes in collection and marketing of non- timbers forest products (NTFPs) in Chhattisgarh, India. *Plant Archives.* 15(2): 788-793.

Gupta, S.P. and Prasanth, D.S. 2004. Marketing and processing of cashewnut in Goa State, an economic analysis. *Agricultural Marketing*. 47(1): 20-29.

Haldar, A. K., Srivastava, R., Thampi, C. J., Sarkar, D., Singh, D. S., Sehgal, J and Velayutham, M. (1996) Soils of Bihar for optimizing land use. National Bureau of Soil Survey and Land Use Planning, Nagpur, India. NBSS Publication. 50b. (Soils of India Series).

Handiganur, S. 1994. Economics of production and processing of grape in Bijapur districts, Karnataka. *M.Sc. (Agri.) Thesis*. University of Agricultural Sciences, Dharwad, India.

Islam, M.A., Quli, S.M.S., Rai, R. and Sofi, P.A. 2013. Livelihood contributions of forest resources to the tribal communities of Jharkhand. *Indian Journal of Fundamental and Applied Life Science.* 3(2): 131-144.

Islam, M.A., Rai, R., Quli, S. M. S and Tramboo M. S. 2015. Socio-economic and demographic descriptions of tribal people subsisting in forest resources of Jharkhand, India. *Asian Journal of Bio Science*. 10(1): 75-82.

Jaiswal, A. K., Sharma, K. K. and Kumar, K. K. 2001. Practices of lac cultivation by farmers on non- conventional lac host trees. *Journal of Non Timber Forest Products*. 8(1/2):25-28.

Jaiswal, A.K., Sharma, K.K and Kumar, K. K. 2003. Problems of lac growers in Jharkhand state *Journal of Non Timber Forest Products*. 10(1/2):46-50.

Jaiswal, A.K.,Sharma, K. K. and Kumar K. K. 2006. Importance of lac in the socio-economic life of tribals in Ranchi district, Jharkhand, India . *New Agriculturist*. 17(1&2): 133-137.

Jaiswal, A.K., Singh, J. P and Dwivedi, B.K. 2011. Strategies for enhanced and sustained lac production – A viable option of economic security. *Bioved.* 22(1): 97-114.

Jayalakshmy, V. G and Abdul, S. M. 2002. Cost of establishment of a cashew apple processing unit and production cost of cashew apple syrup. *The cashew. 26,* 15 (2): 29-33.

Joshi, M.G., Wadkar, S.S., Veerkar, P.D. and Powar, A.G. 1999. Comparative economics of scale of processing Alphonso Mango into pulp in south Konkan region. *The Bihar Journal of Agricultural Marketing.* 7(2): 190-194.

Khopragade, D., Thomas, M., Pachori R., Sharma, J.L and Srivastava, A. 2012. Farmer participatory trial on the predator management of lac insect *k. lawwi* (kerr) in Anuppur district, Madhya Pradesh. *Journal of Tropical Forestry*. 28(1&2): 38-45.

Kumar, A. and Das, R. 2012. New technology and chances of lac culture. Indian Council of Forestry Research and Education, Dehradun. 5-7

Lakra, V.S. 2012. Livelihood and forest conservation (with special referenceto lac cultivation in Chhattisgarh) Chhattisgarh State Minor Forest Produce (Trading and Development) Cooperative Federation Limited. Raipur.

Mandal, J. P and Sarkhel, J. 2014. Cost of lac cultivation and its profitability in Purulia district – a case study. *Business Spectrum*. 4(1): 1-10.

Mishra Y.D. 2011. Technology of lac cultivation on palash. *Recent Advances in Lac Culture* .ICAR-IINRG, Ranchi. 157-164.

Mishra, B.K. 2010. Documentation on the bio resorce based industries in Jharkhand and the bio- resource utilized. Institute of Forest Productivity. Indian Council of Forestry Research and Education, Dehradun, India.

Mohammad, S., Vema, P., Seth, K. M and Rathiya, R. 2015a. Constraints of production and marketing of lac in Korba district of Chhattisgarh. *Journal of Plant Development Sciences.* 7(7): 607-610.

Mohammad, S., Verma, P., Seth Kumar, Mukesh and Rathiya, R. 2015b. Analysis of production and marketing of Palas tree(Lac) in Korba district of Chhattisgarh, India. *Journal of Plant Development Sciences*. 7(7): 497-500.

Nag, S. K., Gauraha, A. K., Banafar, K. N. S. and Chandrakar, M. R. 2016. An an economic analysis of cashew nut processing in bastar district of Chhattisgarh state, India: A case study. *Plant archives*. Vol. 16 No.1:122-124.

Naidu, M.R., Kumar, K.N.R and Murthy, P.S.S. 2003. Temporal variations in marketing of minor forest produce in tribal areas of Andhra Pradesh- A case study. *Indian Journal of Agricultural Marketing*. 17(3):39-49.

Omkar, K., Suthari, S., Alluri, S., Ragan, A. and Raju, V.S. (2012). Diversity of NTFPs and their utilization in Adilabad district of Andhra Pradesh, Indian. *Journal of Medicinal Plant Studies.* **1**(1): 33-46.

Pal Govind. 2009a. Impact of scientific lac cultivation training on lac economy – A study in Jharkhand. *Agricultural Economics Research Review*. 22(1): 139-143.

Pal Govind. 2009b. Resource use efficiency and level of technology adoption in lac cultivation among trained and untrained lac growers in Jharkhand. *International Journal of Agricultural Science*. 5(2): 615-618.

Pal Govind. 2009c. Socio economic characteristics of lac growers in kanker district of Chhattisgarh, India. *Indian Forester*. 137(11):1296.

Pal Govind, Bhagat, M.L and Bhattacharya, A. 2009. Lac cultivation as risk coping strategy for agriculture in Jharkhand. *Indian Forester.* 129(12): 1136-1145.

Pal Govind. 2013. Lac production and processing in Chhattisgarh status and prospective. *Rashtriya Krishi*. 8(2): 19-21.

Pal, G., Jaiswal, A. K and Bhattacharya, A. 2009. An analysis of price spread in marketing of lac in Madhya Pradesh. *Indian Journal of Forestry*. 32(4): 581-584.

Pal, G., Jaiswal, A. K and Bhattacharya, A. 2010. Estimation of lac production and processing in india. *Enivironment and Ecology*. 28(1B): 572-576.

Pal, G and Patel, B. 2013. An economic analysis of lac marketing in Kanker district of Chhattisgarh. *Indian Forester*. 139(3): 256-259.

Pal Govind. 2014. Marketing Scenario of lac in India. *Rashtriyakrishi*. 9(1):55-56.

Paul, B., Kumar, S. and Das, A. 2013. Lac cultivation and their host trees found in Bastar forest division. *Plant Sciences Feed*. 3(1): 8-11.

Raikar, N.A.1990. Investment in production and marketing of cashew in Karnataka. *M.Sc. (Agri.) Thesis*. University of Agricultural Sciences, Dharwad, India.

Ramanathan, G. and Sundaravaradarajan, K. R. 2015. Economics of Cashew Processing Technology in India. *Acta Hortic*. 1080, 361-367.

Ramani, R., Yogi, R. K. and Bhattacharya, A. 2014. Supply chain management in lac. *Supply Chain Management in Agriculture*. National Academy of Agricultural Research Management (NAARM).137-160.

Sachin and Kumar, T.N. 2008. Economics of jaggery production in Karnataka. *M.Sc. (Agri.) Thesis.* University of Agricultural Sciences, Bangalore, India.

Sahu, R.M., Sarawgi, A.K. and Kumar, K.S. 2007. Trend and growth rates of production and revenue of minor forest products in Madhya Pradesh. *Indian Journal of Agricultural Economics*.62,1:461

Santosh. 2008. An economic analysis of production and processing of red gram in Gulbarga district of Karnataka. *M.Sc. (Agri.) Thesis*. University of Agricultural Sciences, Bangalore, India.

Shah, T. H And Thomas, M. 2015a. Lac production, constraints and management. *International Journal of Current Research*. 7(3): 13652-13659.

Shah, T. H and Thomas, M. 2015b. Comparative study of production cost and net returns in rice and lac cultivation. *Trends in Bioscience*. 8(3): 788-791.

Sharma, K.K., Jaiswal, A.K. and Kumar,K.K. 2001. New record of fungi assosciates with Indian lac insect, *kerria. lecca*. *Indian Journal of Entomology*. 63(3):369-371.

Sharma, K.K., Jaiswal, A.K. and Kumar, K.K. 2006. Role of lac culture in biodiversity conservation: issues at stakes and conservation strategy. *Current Science*. 91(7):894-898.

Sharma, P. 2014. Supply chain of guar products in India: Challenges and options. Supply Chain Management in Agriculture. National Academy of Agricultural Research Management (NAARM). 64-78.

Shivaraya Balappa. 1997. Production, marketing and processing of redgram in Gulbarga district of Karnataka: An economic Analysis. *M.Sc (Agri.) Thesis.* University of Agricultural Sciences, Dharwad, India.

Sridhar, K.B., Dhyanisk, S. K., Dwivedi, R.P., Singh, M., Venkatesh, A., Monobrullah, G. S., Dev, I., Tewari, R.K., Singh, R., Chavhan, S., Uthappa, A.R., Singh, R.and Tripati T.D.2015. A tree with purpose: *Butea monosperma* improving livelihood of disadvantaged rural people of central India. Proceedings of XIV *World Forestry Congress* , Durban , South Africa.

Shukla, N and Pandey, S. 2015a. A study of marketing and processing of forest produce in Chattisgarh state. *International Research Journal of Engineering and Technology*. 2(8):1665-1671.

Shukla, N and Pandey, S. 2015b. Performance measurement of marketing of forest produce in Chattisgarh state. *International Research Journal of Engineering and Technology*. 2(8):1659-1664.

Singh, A. K., Jaiswal, A. K., Bhattacharya, A., Singh, R. K., Monobrullah and Goshal, S. 2015. Maximization of profitability through lac production on *Fleminga semialata* – a bushy lac host. *Vegetos*. 28(2): 219-222.

Singh, A. K. and Talukdar, R. K. 2002. Utilization behaviour of forest resources in forest villages of Assam. *Journal of Non-Timber Forest Products*. 9(1/2) : 9-15.

Singh, P. K and Quli, S. M. S. 2011. Economic valuation of non – timber forest products contribution in tribal in tribal livelihood in West Singhbhum district of Jharkhand. *The Indian Forester*. 137 (11):1258 – 1264.

Sinha, P., Sain, D. K and Giri, A. K. 2007. Exploitation of tribes in factor and product markets in Tripura. *Indian Journal of Agricultural Economics*. 62,1:429.

Sircar, S., Saha, A. K, Veerendra, H. C. S and Kujur, R. S. 2013. Lac cultivation in India: II, lac prices at grower s level. *Indian Forester*. 139(9): 821-825.

Srivastava, S. C. 2011. Lac host plant- current status and distribution. Indian industry Indian institute of natural resin and gums, Namkum, Ranchi. 73-81.

Sukanya, C. 2006. Economic analysis of Production and marketing of vanilla in Karnataka. *M.Sc. (Agri.) Thesis*. University of Agricultural Sciences, Bangalore, India.

Surayya, T. 2000. Dependence of forest dwellers on fuel – wood and Non-wood products for their survival and pertinent marketing issues. Proceedings of International workshop on agro-forestry and forest products, Aizwal, Mizoram, India.

Tewari, D. D and Campbell, J. Y. 1995. Developing and sustaining non-timber forest products: some policy issues and concerns with special reference of India. *Journal of Sustaiable Foresty*. 3 (1): 53-79.

Wadkar, S. S. and Patil, H. K. 2002. Economic analysis of processing and export of cashew. *Agricultural Economics Research Review*. 15(2): 236-237.

Wadkar, S. S., Dalvi, M. B. and Bagade, S. R. 2005. Comparative economics of large scale and house hord level cashew processing units. *The Cashew.* XIX (2): 20-28.

Watt, G. 1908. The commercial products of India (being an abridgement of the dictionary of the economic products of India). *Lac Insect*. VIII: 1053-1066.

Yadav, Shiv Mangal, Rai, J and Kumar, A. 2014. An empirical appraisal of production export potentialities and policy reform for lac cultivation in india. *Plant Archives*. 14(1): 425-430.

Yogi, R. K and Jaiwal, A. K. 2014. 2014. Socio – economic characteristics of lac growers and host utilization pattern: a comparative study. *International Journal of Information Management*. 15(2): 37-46.

Yogi, R. K and Singh, A.K. 2015. Socio- Economic silhouette and value chain analysis: an over view of lac sector. Advances in Lac

Production, Processing, Product Development and Value Addition. ICAR- IINRG, Ranchi.189: 197.

Yogi, R. K., Kumar Alok and Jaiswal, A.K. 2017. Lac Plant Resins and Gums Statistics 2015: At a Glance. ICAR – Indian Institute of Natural Resins and Gums, Ranchi (Jharkhand). 01-72.

Appendices

ACHARYA N. G. RANGA AGRICULTURAL UNIVERSITY
S.V. AGRICULTURAL COLLEGE, TIRUPATI
DEPARTMENT OF AGRICULTURAL ECONOMICS

HOUSEHOLD NO.:

SCHEDULE

"ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF LAC IN RANCHI DISTRICT OF JHARKHAND STATE"

1. INTRODUCTION

Name of HOH			Caste/tribe		SC/ST/OBC	Religion		Contact No.	
Village		Block		Police station		District		Date	

2. HOUSEHOLD MEMBERS: GENERAL INFORMATION

Name	Sex M/F	Age*	Relationship to HOH	Marital Status©	Occupations (primary, secondary, other)	Place of work	Literacy Status®	Education level☺	Current ॐ Enrollment

***** Age in completed years, In months if ≤4 years, In days if ≤1 month.
© 1. Never Married, 2. Currently married, 3. Separated/divorced, 4. Others (specify). ॐ Yes/No
® 1. Illiterate, 2. Can Sign name, 3. Can read but cannot write, 4. Can read and write. ☺ Education in completed years.

3. INFORMATION ABOUT LAND HOLDING

Particulars	Land type & Extent (specify units) ☪				Type of contract✠		Duration if not owned✡	Irrigation			Value in Rs.
	1	**2**	**3**	**4**	Annual	Seasonal		Source❄	Flow/lift♍	Ownership✪	
Own land					--------	--------					
Land leased out											
Land mortgaged out											
Land leased in											
Land mortgaged in											
Land sold (recent)											
Land purchased (recent)											

☪1. Crop land, 2. Orchard/land with trees, 3. Pasture, 4. Other (specify). ✠ Cash/kind, Fixed/shared rent, mortgage money.

✡ Contract time ❄ 1. Canal/river/aquifer, 2. Tank/pond/reservoir, 3. Tubewell/borewell, 4. Traditional open well.

♍ 1. Gravity, 2. Electric pump, 3. Diesel/kerosene pump, 4. Manual lift, 5. Other (specify)

✪ 1. Government/ panchayat/ community, 2. Own source including jointly owned, 3. Private water seller.

4. INFORMATION ABOUT LAC CULTIVATION

Type of Lac host trees	Number of trees	Extent (specify units)	Owned	Leased/mortgaged in			Leased/mortgaged out			Present value (in Rs.)
				Area/ No.	Duration	Rent	Area/ No.	Duration	Rent	
Kusum										
Palas										
Ber										
Others (specify)										

5. PRODUCTION AND SALES ON OPERATIONAL HOLDING IN THE LAST AGRICULTURAL YEAR

A. Cropping Pattern and crop schedule

Sl. No.	Crop	Variety	Tenurial status (O/L/M)*	Extent	Month of sowing/inoculation	Month of harvesting	Source of water	Specify the way, if irrigated	Comments

*O: owned, L: leased in, M: mortgaged in

B. Production and sales

Sl. No.	Crop	Production		Home consumption❋		Sale of lac			Where marketed	Marketing agency	Transportation to the market		Other marketing cost	Was the price fixed before harvest
		Main product	By-product	Main product	By-Product	Month of disposal	Quantity	Price			Mode	Value		

6. INPUT USE FOR EACH CROP ON OPERATIONAL HOLADING

Crop code (Sl. no. as in 5A)	Organic Manure							Chemical fertilizer			Seeds				Plant protection (value)	Irrigation charges	
	Type	Home produced		Purchased		Transportation		Type	Qty	Value	Home produced		Purchased				
		Qty	Value	Qty	Value	Mode	Cost incurred				Qty	Value	Qty	Value		Source	Value

7. LABOUR DAYS EMPLOYED IN OPERATIONAL HOLDING IN LAST AGRICULTURAL YEAR

Crop	Family labour						Daily/casual labour									Exchange labour						Long-term workers cost/Cost of contract	Payment for hired machinery or equipment	Payment for hired animal labour
	Labour days			Work hours/day			Labour days			Work hours/day			Wage rate			Labour days			Work hours/day					
	M	W	C	M	W	C	M	W	C	M	W	C	M	W	C	M	W	C	M	W	C			

8. SOURCES AND TYPE OF EXTENSION SERVICES USED BY THE HOUSEHOLD

Tick out and write details:

Other farmers/friends / Agricultural officer / Extension worker / Input dealer / NGO / Krishi vigyan Kendra (KVK) / Participating training programmes / cooperative society/credit agency/ Radio / Television / Newspaper / Others (specify)

9. SPECIFIED MEANS OF PRODUCTION: OWNERSHIP AND EARNINGS

Sl. No.	Items for irrigation, land preparation, intercultural, harvesting, protection, transport and others	Ownership						Maintenance charges in last year	Rental Earnings in last year	Comments
		Number	Year of purchase or installation	Price paid	Subsidy received, if any	Present value	Present price if purchased now			

ACHARYA N. G. RANGA AGRICULTURAL UNIVERSITY
S.V. AGRICULTURAL COLLEGE, TIRUPATI
DEPARTMENT OF AGRICULTURAL ECONOMICS

SCHEDULE FOR LAC MARKET SURVEY

"ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF LAC IN RANCHI DISTRICT OF JHARKHAND STATE"

A. GENERAL

1. Market (Haat)
   a) Name:
   b) Block:
2. Distance from block and district headquarter:
3. Distance and name of nearest railway station:
4. Distance and name of nearest "pucca" road:
5. Distance and name of nearest NH/SH:
6. Type of market (village/urban):
7. Market days and marketing hours:
8. Purchase of produce:
   a) Syatem of purchase (Whether auction or mutual negotiation)
   b) Cleaning, grading if any before purchase
   c) Supervision over purchase
9. Weighging of produce (Method of weighing):

a) How much variation from metric system:

b) How much deducted:

c) Any supervision/checking:

d) Recording system:

10. Payment of the seller

a) If time taken (how much)

b) If deduction made (how much)

c) Any supervision of the market authority over the payment

11. Market charges if prescribed by the market authority

Particulars	Type of Market Charges	Rate Prescribed	By Whom Payable
Commission			
Market fee			
Weighing			
Storage			
Bag			
Transportation			
Other (specify)			
Total			

12. Origin of dispatches (indicates as % of total volume traded in the market)

Origin					
Name (Crop/season)	**Local Producing Areas**	**Other Blockin the District**	**Outside in the District**	**Outside the State**	**Total**
Dispatch					
Name (Crop/season)	**Local Producing Areas**	**Other Blockin the District**	**Outside in the District**	**Outside the State**	**Total**

13. Market functionaries:

Particulars	**Paikars/ primary purchaser**	**Wholesaler**	**Others (specify)**	**Total**
Number				

B. PRIMARY PURCHASERS (PAIKARS)/ WHOLESALERS

1. Name:

2. Name of the market visited:
3. Most frequently visited market (specify reason):
4. Purchase and sale:

Sl. No.	Item type	Purchasing			Transportation			Marketing			Remarks
		Purchased From	Quantity (quintal)	Rate	Mode	Place	Cost	Sold to	Rate	Charges	
1.	Baisakhi										
2.	Katki										
3.	Aghani										
4.	Jethwi										
5.	Others										

5. Constraints:

ACHARYA N. G. RANGA AGRICULTURAL UNIVERSITY
S.V. AGRICULTURAL COLLEGE, TIRUPATI
DEPARTMENT OF AGRICULTURAL ECONOMICS

SCHEDULE FOR LAC PROCESSORS

"ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF LAC IN RANCHI DISTRICT OF JHARKHAND STATE"

A. LOCATION

1. Name of the village/ town:
2. Distance and name of nearest lac market-
3. Distance and name of nearest town/city-
4. Distance and name of nearest railway station-
5. Distance and name of nearest NH/SH-

B. OWNERSHIP DETAILS

1. Date of establishment of the factory :
2. Whether single or in partnership :
3. 3. If in Partnership, then please provide the details below:

Sl. No.	Name of the partner	Residence	Activity	Share (%)		Remarks
				Capital	Profit	

C. EMPLOYMENT SCHEDULE :

Particulars	Administration	Supervisory/ Technical	Workers				Total
			Skilled		Unskilled		
			Temporary	Permanent	Temporary	Permanent	
Total number of employees							
Total Salaries (in lakh Rs.)							

D. PRODUCTION SCHEDULE :

1. No. of shifts per day:
2. No. of working hours in each shift:
3. No. of workers in each shift:
4. Total no. of working days:
5. Production:

Type of Lac	Seedlac	Shellac	Button Lac	Bleached lac	Dewaxed lac	Lac Dye	Others (specify)
Production capacity of the unit							
Production in quintal							
Price in Rs./quintal							
Byproduct	**Patti**	**Molama**	**Kuhni**	**Kiri**	**Passewa**	**Lac Dye**	**Others (specify)**
Production in quintal							
Price in Rs./quintal							

E. CAPITAL INVESTMENT (PRESENT VALUE)

Land and Building :	Crushing Machine:	Sieve :	Washing Vats/Barrel :
Belchi :	Hydraulic Press Machine :	Roller Machine :	Bhatta :
Boiler :	Steel Vat :	Other Equipments :	

F. EXPENDITURE

1. Raw material cost (in Rs.):
   a. Scrapped lac/ stick lac: b. Charcoal: c. Caustic soda:
   d. Markin cloth: e. Oxalic acid f. Others (specify):
2. Electricity fitting cost :
3. Electricity charges (per month) :

4. Rent (building) per month & per annum :
5. Water source and expenditure :
6. Marketing Cost :
7. Packaging cost (specify the packaging unit, eg. 25kg/50kg/100kg. etc) :
8. Grading/ testing :
9. Transportation (means/cost) :
10. Commission charges :
11. Others (Specify) :

G. STORAGE AND MARKETING

Sl. No.	Items	Storage			Marketing				Remarks
		Period	Quantity	Cost	Market place	Mode of transportation	Cost of transportation	Market fees & charges	
1.	Seed lac								
2.	Shellac								
3.	Scrapped lac								
4.	Button lac								
5.	Lac dye								
6.	Others								

H. CONSTRAINT

10. INCOME EARNED BY THE HOUSEHOLD MEMBERS IN LAST YEAR

Name of the worker	Description of work (Agricultural, non-agricultural, business, MGNREGS, salary, rent, pension, scholarship, remittances, etc.)	Place of work	Labour days	Wage rate	Type of wage contract (daily, monthly, yearly, piece rate, etc.)	Total earnings in last year	
						Cash	Kind