A Research on
Impact analysis of NTFP and proposed model of Lac development
Under the project
Sustainable Agri-based Livelihood Enhancement, Charama, Kanker, Chhattisgarh

By

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Submitted to

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Abbreviations and Acronyms

NTFP	Non Timer Forest Produce
GVT	Gramin Vikas Trust
CInI	Central India Initiative
JFMC	Joint Forest Management Committee
NGO	Non Government Organization
SHG	Self Help Group
JLG	Joint Liability Group
KRIBHCO	Krishak Bharati Cooperative Limited
RPM	Regional Program Manager

Acknowledgment

This study would not have been possible without the support and guidance of my guide Mr. Vijay Bhushan, RPM, GVT Raipur. His deep rooted involvement in GVT's operations, his vast experience in this field and knowledge helped ignite my interest in the project and made the experience of my stint memorable in many ways. I sincerely appreciated his candor, honesty, and dedication. He challenged me to think rigorously and helped in resolving my queries. I deeply appreciate his valuable inputs and encouragement during the course of the study. I also thank him for the time he took to read and evaluate my work despite his busy schedule and provided me new lines to think on after every discussion.

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Shanti Prakash

TAS Manager

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EXECUTIVE SUMMARY

GVT, a development organization promoted by KRIBHCO, has taken a development project in 25 villages of Charama block of Kankar district with aim to work with 5000 families to raise their family income from 20000 per year to 65000 per year in five years. Along with other development activities under the project umbrella, GVT in partnership with CInI plans to promote NTFP based income enhancement in the villages. This study is conducted to assess impact of NTFP on tribal families, identify potential NTFP and propose a detailed plan on the most potential NTFP.

A detailed study in the project area was conducted with analyzing primary and secondary research data from 116 families, Forest Department, State Silk Board and NTFP markets. It was found NTFP contributes to almost one third of income for tribal families. This percentage doesn't change much from marginal to large farmers. All family members except small and school going children work to collect NTFP. Most of the NTFP are being sold unprocessed in nearby block level market. Farmers don't collect the produce and sell the NTFP as and when they need cash to run their family. Only 9% farmers have ever planted trees to collect NTFP. Mahua contributes maximum (55%) to total NTFP income for tribal families. After detailed analysis of available resources, potential of a particular NTFP, motivational level of farmers for the NTFP, long term demand-supply analysis, and feedback from various experts; Lac is chosen as the focus NTFP for detailed study.

Once the overall demand supply was analyzed, Lac crop was studied in detail. Any intervention would require detailed understanding of the crop and challenges associated with it. Lac crop can be cultivated four times in a year combining different strain of Lac. Three out of four month in which Lac crop is harvested viz. Jan, Apr, June and Oct most of the tribal families faces severe cash crunch. So a successful Lac crop can solve many other problems in the block.

The overall demand supply situation for Lac was studied in detail which suggests that on one hand demand of Lac which is used in multiple industries is increasing; on the other hand the production is falling. This demand supply mismatch establishes the case for profitable Lac production for the farmers.

The Charama block has abundant Kusum, Palash, Ber and Kher host trees for Lac cultivation. Forest Department estimates only 10% host trees are being utilized for Lac cultivation so there exists a tremendous scope of improvement in production. People in the region have been historically cultivating Lac with traditional methods. The survey data indicates that crop failure due to lack of training, climatic vagaries and lack of brood Lac are most frequent challenges faced by Lac farmers.

To further assess the challenges faced in Lac cultivation, motivation level of farmers and quality of existing training infrastructure, training sessions were organized for over 100 farmers in four villages in the project area. Trainings sessions were followed by focused group discussion on Lac farming.

A detailed study of Lac value chain was conducted which shows lack of bargaining power with farmers. The scraped law is not stable and needs to be sold quickly, with less production and pressure to sell quickly, farmers get poor price many times.

After analyzing the various data and detailed discussions with expert members from CInI, GVT, Forest Department, other NGO (PRADAN) and Dr. Moni Thomas, MP Chief Ministers' fellow and principal advisor; a detailed strategy for Lac based income enhancement is proposed in the recommendations section. The strategy coupled with action plan which GVT is advised to implement to promote Lac in the region. The strategy is divided in three phases with increasing time horizons.

In phase one, GVT needs to boost production level and establish market linkages for the farmers in the area. This requires intervention at various levels which are detailed out in recommendations section. In phase two, once the production and market linkages are established, GVT can go for value addition. The economic analysis and sensitivity analysis of Lac processing has been performed. In phase three, it is recommended GVT should streamline its efforts for development in villages. GVT in partnership with National Horticulture Mission should plant Ber trees as border plantation in its 2000 acre of Wadi so that Lac farmers can continue cultivating Lac once they move towards their Wadis.

Key risks and risk mitigation strategies are recommended as part of study. Initial study on Kosa and Mahua has been performed which can act as starting point for further study in the area.

CHAPTER I – BACKGROUND OF THE PROJECT

Organization Background

Gramin Vikas Trust is a development organization promoted by Krishak Bharati Cooperative Limited (KRIBHCO) a premiere Cooperative in Fertilizer sector under the Administrative Control of Government of India in collaboration with DFID-UK as an independent legal entity to plan and implement participatory development programmes in resource poor areas. Gramin Vikas Trust aims to establish and maintain long-term links with the Government Organizations, Non-Government Organization, Panchayati Raj Institutions, Community Based Organizations (CBOs), and Resource Institutions, to sustain and strengthen the livelihoods development in the backward tribal areas.

- **Goal:** Develop more effective policies and programs for reducing the poverty in rain-fed areas of India.
- **Vision:** To become a vital player for reducing rural poverty in India through enhancement of sustainable livelihoods
- **Mission:** Act as a catalyst to enable the socially and economically disadvantage rural and tribal communities to improve their livelihoods on sustainable basis, especially in the resource poor of the rain-fed areas.

GVT specializes in fields like natural resource management, watershed development, agriculture, livelihood improvement, institutional development, women empowerment, labor supports and micro enterprise development. After gaining years of experience working on the development of rural economies, GVT has established National Livelihoods Resource Institute in Ratlam, M.P. to share its experiences with a wider audience through an annual calendar of client-responsive activities like interactive trainings, participatory research etc.

Presently GVT is operational in Rajasthan, Gujarat, Madhya Pradesh and Chhattisgarh in the West, and Orissa, Jharkhand and West Bengal, in the East. In the pursuit of its goal, GVT has partnered in Chhattisgarh with CInI, NABARD, Forest Department, RiUP, NRAA, etc.

GVT Chhattisgarh

GVT is operational in Chhattisgarh since 2004-05 through the PFT (Project Facilitating Team) at Chhuria Block of Rajnandgaon District under Chhattisgarh District Poverty Reduction Project (CGDPRP). GVT, Raipur Office has undertaken number of monitoring and evaluation studies of Forest Department funded by State as well as Central Govt. This office has undertaken the work of preparation of JFM micro-plans from Forest Department in Raipur, Dhamtari, Kanker, Durg, and Narayanpur Districts.

Project background

In Feb 2009 GVT started its operations in 25 villages of Charama block of Kankar district. The goal of the project is to work with 5000 families in the project area to raise the family income from 20000 per year to 65000 per year in five years.

Presently GVT is implementing Wari model of horticulture promotion for 2000 families with the financial support from NABARD for seven years. Another project on dissemination of high yielding paddy is also going on in the project villages.

To further the development in the villages and improving livelihood of more than 5000 families, GVT has received support from CInI under the project Sustainable Agri-based Livelihood Enhancement of Poor Tribal Community of Charama Block.

It is observed NTFP is important cash source for families in the project villages. Lac is one the important NTFP which has been traditionally been cultivated in the project area. To assess the impact of NTFPs on tribal families in the project area and identify key NTFPs which can be pursued by GVT to increase the household income; GVT has been funded by CInI to conduct research on available NTFP with special focus on Lac cultivation in the region.

Study Objectives

- Objective1: Assessment of Impact of NTFPs on the tribal livelihood
- Objective2: Identification of NTFPs, GVT should focus its efforts on
- Objective3: Detailed study on Lac production, processing and recommendations on Long term strategy, action plan and interventions required to promote Lac based income generation in the region.

Present status of the project

Interventions for NTFP based income generation are at very nascent stage in the project area. GVT has not conducted any prior research on NTFP in the project area. Around 100 farmers had been taken on an exposure visit on Lac cultivation in nearby village Tirkadand. Farmers cultivate Lac using conventional techniques and for past couple of years due to unavailability of brood Lac many farmers have not cultivated Lac.

Expected Outcome

A detailed report covering assessment of impact of NTFP on tribal families, identified set of NTFP which GVT should focus on and strategic recommendations and action plan to promote Lac based income generation in the project area. Further the plan should be ready to execute with a detailed list of interventions GVT needs to make with key partners identified.

Scope of the Study

The scope of the study and recommendations is restricted to 25 project villages in Charama block, Kanker district, Chhattisgarh.

CHAPTER II – METHODOLOGY

Methodology

Following steps were taken to understand the project context and complete the study and final recommendations.

PHASE1: Understanding of context and freezing of research objectives and scope

Step1: Understanding of context by discussions with CInI anchor, GVT nodal partner and program managers

Step2: Visit to project villages and initial discussions with tribal families, JFMC, and Gram Panchayats

Step3: Visit to government offices like forest office, agriculture office, silk cultivation office etc in the project villages to understand their role and views.

Step4: Discussion of initial findings with GVT nodal person and CInI anchor to freeze the project objectives and action plan

PHASE2: Research and analysis

Step5: Creation of detailed survey to meet the study objective

Step6: Identification of sample villages and conducting survey in the villages.

Step7: Analysis of survey and discussion on findings with GVT field officers, Program managers, Nodal person and CInI Anchor.

Step8: Discussions of findings with experts on Lac cultivation e.g. experts from forest department, expert farmers, Trainers etc

PHASE3: Recommendations – Strategy and Action Plan

Step1: Conducting training on Lac cultivations in four villages and FGDs post training to access issues and challenges faced by farmers in more details.

Step2: Visit to SHGs cultivating Lac through modern methodology and understand its impact in the village.

Step3: Market visits to understand value chain of Lac and its trading.

Step4: Visit to Lac processing center in the district.

Step5: Discussions with forest department, GVT members and CInI anchors to propose overall strategy for the project

Step6: Discussions with GVT nodal point, CInI anchor on recommendations and strategy:

Step6: Feedback on proposed study from Lac expert Dr. Moni Thomas, MP Chief Ministers' fellow and principal Investigator, Jawaharlal Nehru Krishi Vishwavidyala. Jabalpur, MP.

Step7: Overall recommendations, Strategy and action plan and identified partners

Procedure and time frame

A detailed plan was prepared to achieve maximum results in a very short time. The snapshot of 30 days plan is presented below

	ACTIVITY DESCRIPTION End date for Activity	SUB-ACTIVITIES	Proposed Action	Estimated days needed for sub-actvities
1	Understanding the context and settting focus area for the project	Field Visit - First level understanding of NTFPs collected by tribals and village economy	(1) Visit to district silk board office	4 days
		Identify Focus list of NTFPs to study	(2)Visit to project villages	
			(3) Study and research about NTFP and context	
2	Impact Analysis of NTFPs - Village Survey	Primary survey to understand impact of NTFPs	(1) Creation of Detailed Survey	10 - 12 days
		Secondary data analysis to analyse overall impact and potential	(2) Identifying 5 - 6 sample villages to conduct survey of 120 farmers	
		Understand impact on livelihoods of farmers	(3) Survey in the villages	
			(4) Collation, analysis of Data obtanined in the survey and survey findings	
3	Lac Promotion	Promotion in 3 sample villages to assess farmers response and queries	(1) Strategy formulation for Promotion	4 days
			(2) Three day Promotion and Traning by organizations providing Lac seeds	
			(3) Co-ordination with District Sericulture department for joint promotion of Tassar, Cordination with forest office for promotion & Training of Lac	
4	NTFPs Value chain study	Market Visit and Survey - to understand the role of middlemen and financial model	(1) Primary Research - Visit to SHGs active in Lac cultivation, Meeting with Dr. Moni Thomas at Jabalpur, MP	9 - 12 days
		Visit to other government and non government agencies working on identified NTFPs	(2) Visit to Lac processing centers	
			(3) Secondary research - Study of existing reports and data collected from various offices and internet	
			(4) Visit to Government offices in Raipur and Kanker District	
			(5) Market Visit - Raipur, Dhamtari, Block level markets and Village Haat	
5	Final Report & Recommendations	Proposal of Model to improve profitability of farmers	(1) Discussions on Value chain study findings, Strategies to keep farmers motivated	4-5 days
			(2) Analysis of resources and Identification of possible partners	
		Recommendations	(3) Framework and action plan - Marketing and promotion strategies	
		Final Report	(4) Identification of how Cini & GVT can make successful interventions and long term plans for Lac	

Population and sampling

The focus of the study was to identify impact of NTFP on the livelihood of the tribal families. Assessment of Lac cultivation and its impact was focus area of the study. Keeping these objectives in mind the population for the study was NTFP collecting tribal villages in the project area. For selection of sample villages, stratified sampling method was used.

Selection of villages

As the focus of the study was analysis of Lac and the villages with maximum potential for Lac were considered for sampling. To assess the potential of successful intervention by GVT following factors were considered

- Number of host trees in a village. Data from forest department was obtained for the same to identify villages with maximum number of host trees
- Existing activity on Lac cultivation in the village: This was another factor which was used to identify sample villages. Feedback from forest department, discussions with beat guards, local people and GVT field officers was used to identify such villages.
- Motivation and willingness of people in the villages: Qualitative judgment on motivation was taken after discussions with GVT field officers, Jankars, beat guards and interaction with few local people and JFMC heads.

The above selection process helped in identifying five sample villages viz. Kusumpani, Navdabri, Thana bodi, Hatka Charama and Ranidongri. Snowball sampling was used to identify persons who were to be interviewed in the identified sample villages. Snowball sampling relies on referrals from initial sample to subsequent samples. The key question of referral was

availability of host trees or being active in Lac cultivation. To cover the population more effectively, different small chain of referrals was started in project villages and It was taken care that representatives across the economic classes are there in the sample.

Primary Research

This phase consisted of exploratory study with the objective to obtain field information from the people actually involved in the cultivation, processing and trading of Lac. Various discussions were help with the people, directly or indirectly involved in Lac cultivation. 116 families were surveyed from five identified villages.

Instrumentation

A detailed questionnaire was designed which covered all the aspects of impact of NTFPs in the villages and special focus on Lac cultivation was designed. As the survey data will be used to propose strategies and interventions which GVT should make, the data about cash flows, education, busiest months etc was also captured. The survey instrument is attached in appendix 1.

Focused group discussion was another method used to identify key challenges faced by farmers in Lac cultivation and their view on possible solutions. FGDs were conducted post training in the four villages

Detailed interview with questionnaires and informal interaction were other tools which were used to collect data.

Secondary Research

Secondary research was conducted by collecting information through web, government offices, mandi and research institutions. This helped in building theoretical knowledge base on NTFP specially Lac, Kosa and Mahua. Further the data obtained from government offices and forest department indicated the concentration zone of trees from which NTFPs are collected. This helped in identifying resource potential.

Validity and reliability

Inferences from the survey were compared with data from various sources was compared to assess the validity and reliability. For example, Survey indicated almost negligible cultivation of Kosa in the project villages. This was cross checked with cocoon bank which purchases Kosa cocoons in the district. Similarly forest department data showed the potential villages for Lac cultivation, which was cross checked with GVT field officers and primary survey respondents. Data on Economics of Lac production was again validated from multiple sources and experts.

Limitations

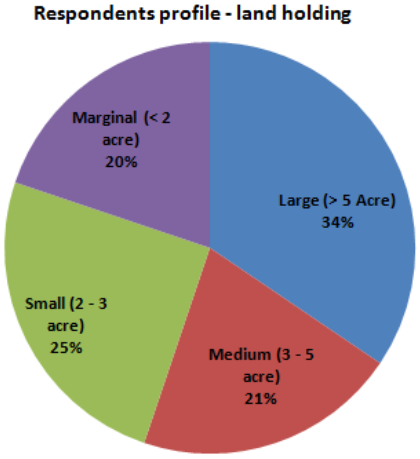
- The study was conducted in only five villages. Considering the size of population in the project villages, a study of 116 families has its limited use.
- Due to unavailability of brood Lac, many farmers have not cultivated Lac for past few year. Thus the challenges faced, market information has limited use.
- Non Familiarity with local language might have caused some data loss during the interviews and FGDs.

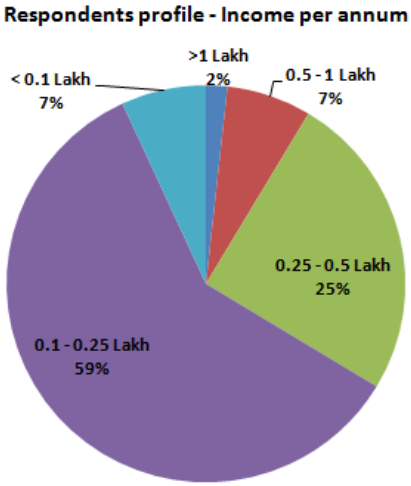
CHAPTER III – FINDINGS

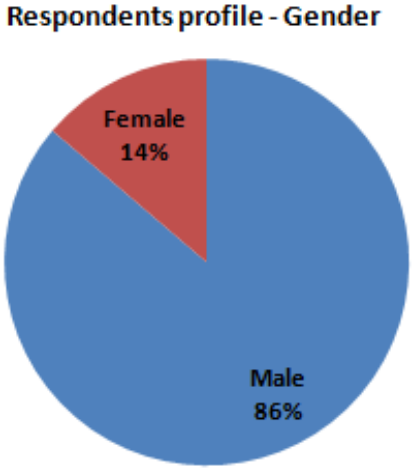
Primary Survey Findings

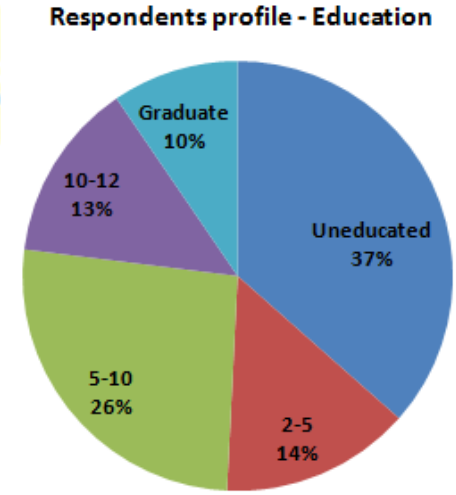
Primary survey, focused group discussions and multiple trainings on Lac cultivations was conducted in five sample villages. The primary survey had 116 respondents with even split in large, medium, small and marginal farmers. The survey and data is attached in appendix 2.

Respondents Profile









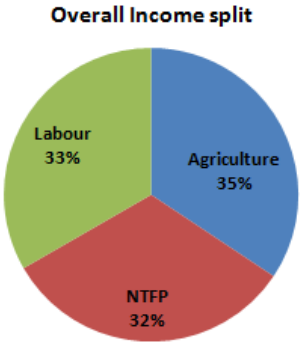
Cash Flows

- 40% of the people were identified to take loan in month of June and repay in month of December after crop harvesting
- More than 70% people identified month of kuwar (Sept – Oct) as most challenging as they don't have any source of income in Sept and Oct.
- More than 80% of people go for NREGA in period of March – April. On an average a family goes for 40 days of NREGA. In many cases the actual payment to labours is delayed by more than 3 months.

Impact of NTFP

Economical & social Impact

- The overall cash income coming from the NTFP as a % of total income for the sample was found to be 32%



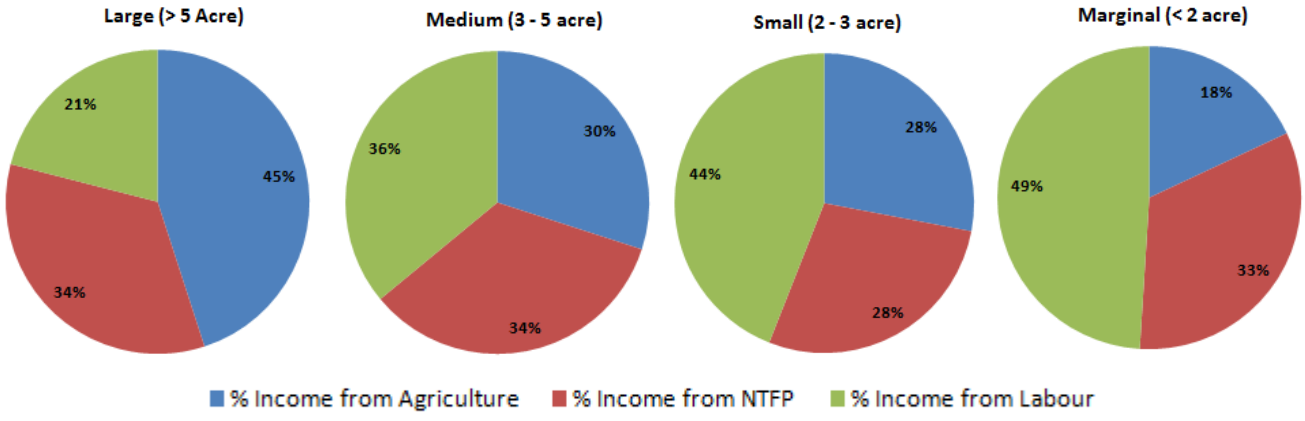
- NTFP gives cash inflows throughout the year. In the project villages followings NTFPs are collected.

Jan	Feb	Mar	April	May	June
•Lac •Anola •Harra	•Harra • Bhera	•Mahua •Bhera	•Lac •Mahua •Chironji	•Chironji •Tendupatta •Bamboo	•Lac •Tori

July	Aug	Sept	Oct	Nov	Dec
• Lac • Tori • Kosa	• Kosa		• Lac	• Sitafal • Anola	• Anola

- NTFP are sold unprocessed to meet immediate cash needs of the tribal. Many times NTFPs like Mahua which farmers can preserve for later use are sold cheap in month of March and April to meet the immediate cash needs, and bought back at almost double the price in later months.

- The percentage of cash incoming from NTFP remains in range of 28% to 34% irrespective of the land which a farmer owns. The other two sources of income viz. agriculture and labour varies across type of farmers as shown in the chart below.



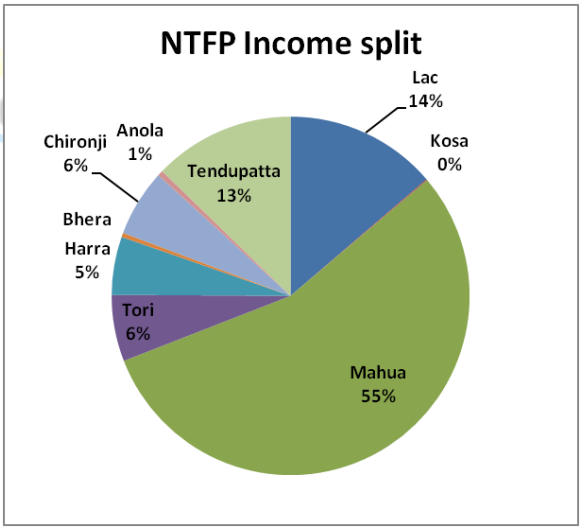
- Every member of the family works to collect NTFP. Most of the marketing is done by male members of the family and women and children works on field to collect the NTFPs. This sometimes lead to children dropping out of schools and injuries as well.

Environmental Impact

- NTFP cultivation doesn't add significant tree additions to the environment. Only 9% of respondents planted trees to collect NTFPs. Most of those planted trees of Mango, Lemon in their wasteland.

Identification of NTFPs to Focus on

It was observed Mahua, Lac, Anola, Chironji, Harra, Bhera and Tendupatta are the key NTFPs collected by farmers in the project villages. The pie chart shows the spilt of income from a particular NTFP in the project area[1]. It clearly indicates Mahua is adding maximum to the income obtained from NTFPs, followed by Lac and Tendupatta. Tori, a fruit obtained from Mahua trees contributes about 6% of cash income generated by NTFP in the project area. Many families do not sell Tori as they use its oil as edible oil.



Marketing of NTFP

The details of the Stakeholders in open marketing of NTFPs are as:

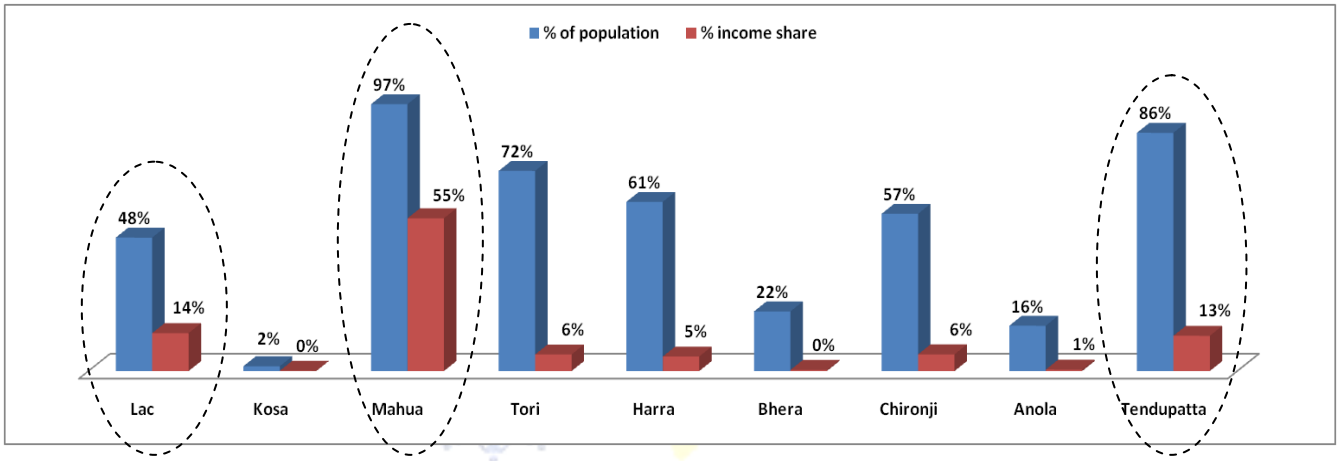
- **NTFPs collectors:** Those collect the NTFPs from the forest. Collectors either sell the products as raw or after drying. They sell the collected NTFPs mainly to village trader/kochiya and sometimes they also sell to City Trader/Big traders.
- **Village trader/Kochiya:** who are small traders located in the same village, the village level trader sell the produce collected from various collectors to the city trader/Big trader they deal in variety in NTFPs.
- **City Trader/Big Trader:** Big trader/City trader sell NTFPs to processors, who process raw NTFPs in to final products. Sometimes collectors also purchase NTFPs from city trader/ big trader during off season i.e. Mahua flowers
- **Processors:** The processors sell the finished product to the distributors/ Whole sellers.
- **Whole seller:** They sell the products to retailers
- **Retailers:** Whole sellers finally sell the products to end users or consumers.

[1] Source: Primary Survey Data

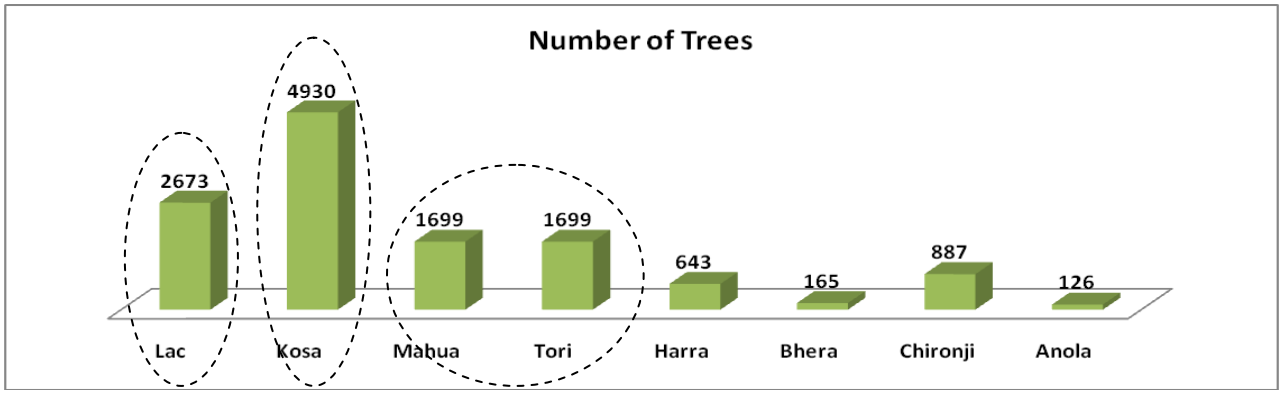
Through MFP Federation marketing of NTFPs involves the following stakeholders-

- **NTFPs collectors:** Those collect the NTFPs from the forest. Collectors either sell the products as raw or after drying. They sell the collected NTFPs to either to SHGs or VSS, called *Van Surksa Samiti*.
- **SHGs/VSS:** SHGs/VSS buy NTFPs from the collectors of NTFPs and they sell to Sanjeevani mart/Processing Unit of Sanjeevani.
- **Sanjeevani Mart:** Sanjeevani Mart is a whole sale unit of raw herbs. They purchase raw material from SHGs/VSS and after processing they send the finished products to Sanjeevani outlet.
- **Sanjeevani outlet:** Sanjeevani is a marketing wing of federation. It acts as a retail outlet. From Sanjeevani outlet it is purchased by the consumers.

The chart below shows the percentage of people who earns from a particular NTFP and % of income share for those people. It clearly indicated Mahua is sold by most people (97%) and it adds maximum share of NTFP income for the Tribal. On the other hand only 2% people cultivate Kosa.



This chart was clubbed with the resource chart of for the area and preferences of people, government support and expert advice were considered to identify NTFP to focus for development.



On the above data the following filters were applied

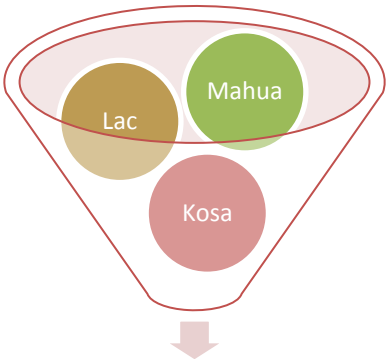
Filter1: *Based on significance of potential income NTFP can generate*

- **Mahua, Lac, Tendupatta** adds significantly to household income in the project area.
- **Kosa** has lot of potential but very few people are cultivating Kosa in the project area.
- Tori, Harra, Chironji and Anola add very little to farmer's income so any intervention by GVT is not likely to have significant impact on overall income of the farmers.

Filter 2: *Based on willingness of farmers, government support and availability of resources in the project area*

- Tendupatta is managed by forest department so dropped.
- Mahua is primarily used for making alcohol and sometimes prickle. Mahua prickle doesn't have much demand in the market; also Mahua alcohol is used by tribal for self consumptions. One of the possible interventions for Mahua is collective procurement, preservation and marketing of Mahua Flowers.
- Kosa has lot of potential in the region in term of host plants to grow Kosa cocoons and government support in providing seeds and market to sell cocoon. but
    - A deeper analysis into the survey data reflects that only 22% people are aware of Kosa farming and of those aware people 76% people doesn't want to try Kosa. The most frequent reason given was poor return on Kosa crop as compared to labour required to cultivate it. Kosa cocoons sells very cheap in the market and most people found keeping the Kosa crop safe from birds, owls problematic. Travelling distance of wasteland where Kosa host tree exists from the main revenue land was also another de-motivating factor. Thus any intervention for Kosa will require starting work from scratch.

    - Data from state silk board which is only buying agency of Kosa cocoon in the project area shows that the production of Kosa cocoon from the project area is negligible. This further proves that despite lot of potential Kosa is presently not cultivated by tribal families in the project villages.



Lac & Kosa

- Lac is most preferable NTFP to focus. 98% people were willing to try any schemes on Lac, considering its profitability and very low labour requirement in cultivating Lac.

NTFP	% Awareness	% of aware people who want to try	% of unaware people who want to try
Lac	97%	98%	100%
Kosa/Tasar	22%	24%	80%

Identified NTFPs

Considering the overall timelines for the project study, potentials of particular NTFP in the region, potential economic benefits and willingness of people to collect the NTFP; it was suggested Lac should be main focus area for the study. Once the intervention at Lac is successful people can be motivated easily for the next intervention for Kosa.

CHAPTER IV – LAC

What is Lac

Lac is the hardened resin, secreted by the tiny Lac insect belonging to a bug family. The widely known Indian Lac insect is Laccifer lacca. Lac insect settles on the twigs of certain host trees, suck the plant sap and grow, all the while secreting Lac resin from their bodies. Since the insects are closely spaced on the twigs, the resin forms continuous encrustations over the twigs of the host trees.

Composition of Lac

Constituent	Approx Proportion
Lac Resin (a polyester complex of straight chain hydroxyl fatty acids and sesquiterpenic acids)	68%
Lac Wax (a mixture of higher alcohol, acids and their ester)	6%
Lac Dye (a mixture of anthoroquinoid derivatives)	2%
Others (Insect debris, sand, impurities)	25%

It is the content of resin in Lac which determines with price.

The Insect

The intervention in Lac sub sector would require the interventionist to understand the Life Cycle of the Insect. This understanding would mean that harvesting and regeneration issues are understood well and thereafter measures taken to help the process continue. The narration below helps one to understand the process in the simplest manner.

Photo Graph of Laccifer lacca

Life cycle of Lac insect

The Life cycle of Lac insect takes about six months and consists of four distinct stages. They are the egg, nymph instars, pupa and adult. The female insect lays around 200-500 ready to hatch eggs, i.e. the embryos are already fully developed in eggs when these are then laid. The egg hatches within a few hours of laying, and a crimson red first in-star nymph called crawlers come out. The crawler measures 0.6 x .25 mm in size. This emergence of nymph is called swarming, and it may continue for another 5 weeks. This is an important stage and those involved with the propagation of Lac must be able to identify when this stage happens. It would be important to take out the twigs at this stage and tie them to the branches.

The nymphs crawl on the branches. On reaching the soft succulent twigs, the nymphs settle down close together at a rate of 200-300 insects per sq inch. At this stage, both male and female nymphs live on the sap of the trees. They insert their suctorial proboscis into the plant tissue and starts sucking the sap. After a day or so of their settling, the nymphs start secreting resin from the glands distributed under the cuticle throughout the body, except its own mouth parts, the breathing spiracles and the anus. The resin secreted is semi-solid which hardens on exposure to air into a protective covering. The nymphs molts thrice inside the cells before reaching maturity.

The duration of each of this in-star is dependent on several factors, viz. temperature, humidity and the host plant on which it preys. Any variation in mean temperature, humidity is likely to affect the production process. After the first moulting, both the male and female nymphs lose their appendages, eye and become degenerate. While still being inside their own cells, the nymphs cast off their second and third moult and mature into adult. Both the male and female larvae become sexually mature in about eight weeks. Only the male one undergoes a complete metamorphosis or transformation into another form; it loses its proboscis and develops antennae, legs and a single pair of wings. It is contained in a brood cell somewhat slipper like with a round trap door (operculum) through which it emerges. The adult male is winged and walks over the females to fertilize them. The female brood cell is larger and globular in shape and remains fixed to the twig. The female retains her mouth parts but fails to develop any wings, eyes or appendages. While developing, it really becomes an immobile organism with little resemblance to an insect. Females become little more than egg producing organisms. The female after having fertilized slowly increases in size to accommodate her growing number of eggs. The Lac resin also gets

secreted at a faster rate, and a continuous layer grows into one body. After about fourteen weeks, the female shrinks in size allowing light to pass into the cell and the space for the eggs. About this time, two yellow spots appear at the rear end of the cell. The spots enlarge and become orange coloured. When this happens, the female has deposited a large number of eggs in the space called 'Ovisac'. The ovisac appears orange due to the crimson fluid also called the Lac dye. Once this is noticed one can surely be ready as this stage indicates that the eggs are to hatch in a week time. When the egg hatches, the larvae emerge and the whole process begins all over again. After the cycle has been completed and around the time when the next generation begin to emerge, the resin encrusted branches are harvested. They are scraped off, dried and processed for various Lac products. A portion of brood Lac is retained from the previous crop for the purpose of inoculation to new trees. This is taken onto another plant and tied to start the process once again.

The Host Plants

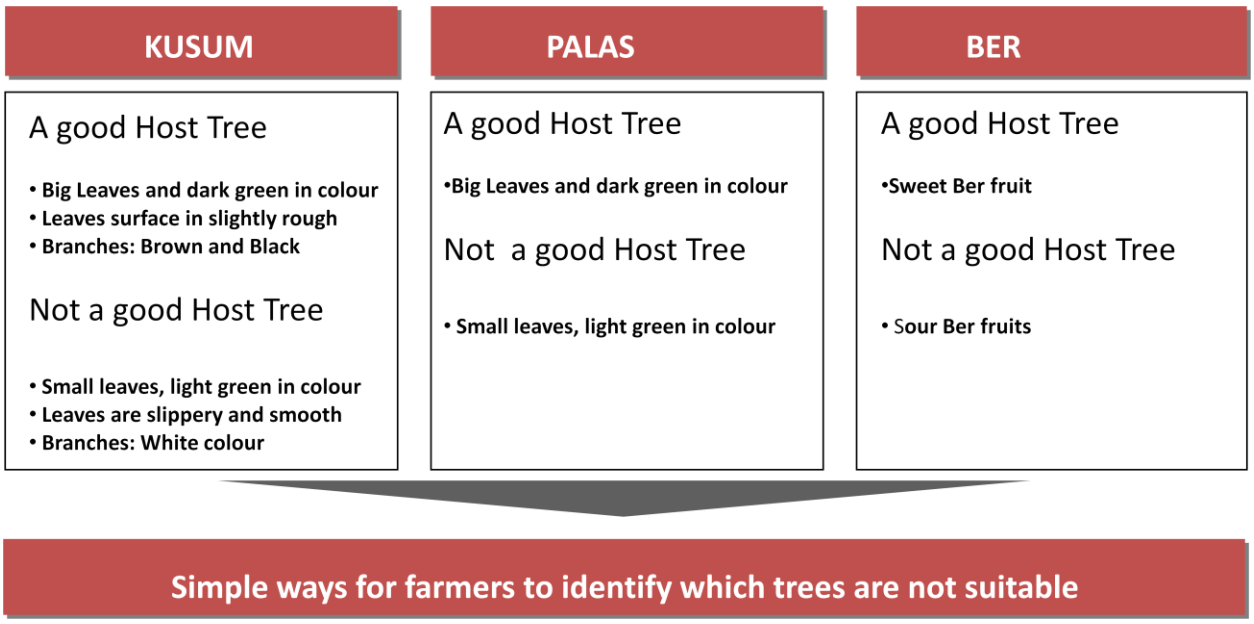
Under natural conditions in Indian subcontinent Lac insect is found infecting a number of host plants. Over 160 species have been documented as host plant of Lacca. However based on the degree of preference of Lac insect and abundance and quality of the Lac obtained three key host plants are

1. Butea monosperma – Palas
2. Schleichera Oleosa – Kusum
3. Zizyphus mauritiana – Ber

In India, Lac yields are dependent upon various factors: the insect strain, the host tree and the crop management system and most important climatic conditions. The annual yields of Stick-Lac per tree as reported in various studies are

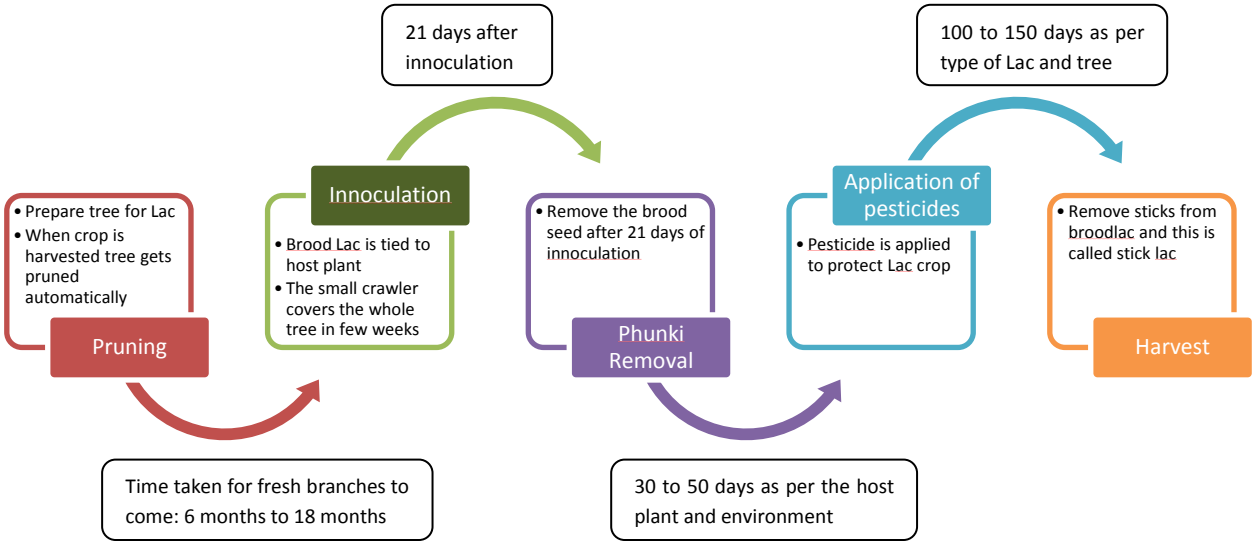
Host plant	Average Annual Yield
Kusum	3 – 10 Kg
Ber	1.5 – 6 Kg
Palas	1-4 Kg

Further the research indicates that not all Kusum, Ber and Palas trees are suitable for Lac cultivation. Some characteristics which a farmer should look before cultivating Lac on a tree are



Lac crop Life cycle – Modern Methodology

Pruning (Equivalent to land plough): It is the process of making Lac tree ready for putting brood Lac (equivalent to seeds for a crop). In this process, select branches of the host tree are cut so that when new branches comes on the host tree, the young larvae can inserts its suctorial proboscis (the organ to suck the sap from the plants) into the fresh an soft twigs and suck the plant sap.



Innoculation (Equivalent to putting seeds in the field): In this process, brood Lac which contains gravid females which are about to lay eggs to give birth to young larvae is put on pruned and prepared host plant. After emergence from mother cells, the young larvae settle on fresh twigs of host plants, suck the plant sap and grow to form encrustations

Phunki removal: After 21 days brood Lac should be removed from host trees. Within first 21 days all the Lac insect comes out of brood Lac and now it is no more generating fresh insects. On the other hand the enemy insect which lies inside the brood Lac starts generating new insects post 21 days. At this time removal of brood ensures plants safety from enemy insects being populated.

Application of Pesticides: After a fixed number of days depending on the type of crop and host, suitable pesticide is sprayed on the host tree to protect the Lac insect from enemy insects

Harvest of brood Lac and stick Lac: Around the time when the next generation of Lac insect begins to emerge, the resin encrusted branches are harvested. They are scraped off, dried (to form stick Lac) and processed for various Lac products. A portion of brood Lac is retained from the previous crop for the purpose of inoculation to new trees. This is taken onto another plant and tied to start the process once again.

Enemy Insects inside Lac

Brood Lac/Stick Lac

Scraped Lac

Lac Strains and crop cycles:

There are two types of Lac strains, the light colored superior quality Kusumi Lac is produced on Kusum and the Ber tree by Kusumi strain of Lac insects, while dark colored Rangeeni Lac is cultivated on Palash, Ber, Ghont and Arhar. There are two crops of Kusumi: Agahani (from July to December) and Jethwi (from January to June). Only Aghani crop is taken on Ber. Similarly, there are two crops of Rangeeni Lac in a year, Katki (July to October) and Baisakhi (October to June-July). The names of the Lac crops are based on the months in Hindu calendar, when it is harvested.

Type of Lac	Time of Pruning	Timing of Inoculation	Harvest of Lac	Duration in months	Name of the Crop	Season
Rangeeni	Mid Feb	July	October	4	Katki	Rainy
	April	October	May June	8	Baishaki	Summer
Kusumi	Winter	July	Dec - Jan	6	Aghani	Winter
	Summer	Jan	June	6	Jethwi	Summer

Key Points

- Only Ber host, for kusumi Lac only Aghani crop is taken
- In the project area, the temperature in summers crosses threshold of 42◦C which is not good for Lac crop. It is advisable to cultivate Lac in Jethwi cycle for main crop and in Aghani cycle the focus can be on security of Brood.

The Industrial Uses of Lac

The Lac dye is a natural dye stuff extracted from Stick-Lac. Prime use of Lac is to shine the stuff it is applied to. It is used extensively as a natural food additive and in cosmetics as well as a colorant for silk and cotton dyeing. It is also used for oil painting in varnishes and possibly in watercolors. The prime uses of Lac are illustrated below[2]

Pharmaceuticals - Shellac is used to coat enteric pills so that they do not dissolve in the stomach, but in the lower intestine, which alleviates upset stomachs. It is also used as a coating on pills to "time release" medication.

Confectionery - Shellac is used to provide protective candy coatings or glazes on candies like Reese's Pieces, because of its unique ability to provide a high gloss in relatively thin coatings (like a French Polish). It was used at one time on M&M's. It is approved by the FDA as a food safe coating when dissolved in pure ethanol (not denatured).

Hats - Shellac is used to stiffen felt used to make hats. It allows the makers to shape the felt into brims, bowl shapes, etc.

Food Coatings – The FDA approval has allowed use of shellac to coat apples and other fruits to make them shinier.

Electrical - Shellac mixed with marble dust is used by lamp manufacturers to glue the metal base to glass incandescent bulbs. In addition to this many other uses for shellac are seen. Shellac is used in the manufacture of grinding wheels (it allows the abrasive particles to break off at the low heat generated by the grinding process, thus exposing new, fresh abrasive particles), leather finishing and painting (shellac pigmented with white titanium dioxide is widely used by painters as a stain sealer, wall board primer, and knot and sap sealer on wood). In addition to this the former uses of shellac has been for electrical insulators, as a glue (it bonds glass and metal surprisingly well), phonograph records (the old 78's were a mixture of shellac, fillers and lampblack), hair spray, no-rub floor polishes, and as a finish for bowling alleys. Shellac is also extensively used by the carpenters as word polish materials, as it gives wood the shine and also longevity.

Lac dye: Lac dye is a mixture of anthroquinoid derivatives. It is traditionally used to color wool and silk. Its color varies between purple red, brown and orange often depending upon the mordant used. It is used in food and beverages industry for coloring. In recent past, Lac dye has been replaced by synthetic dye. But, now-a-days with increasing stress and awareness on use of eco-friendly and safe material particularly associated with human contact and consumption has made revival of great demand of Lac dye as a coloring material.

[2] Report of the study on Lac sub sector, Chhattisgarh state institute of rural development

Lac wax: This is a mixture of higher alcohols, acids and their esters. It is used in Polishes applied on shoes, floor, automobiles etc, Food and confectionary, and drug tablet finishing; Lipsticks and manufacture of Crayons.

Bleached shellac: This being non-toxic and physiologically harmless (edible), it is widely used in the food industries, food packaging and allied industries. Apart from the above, bleached shellac is also used for its qualities i.e. binding, adhesive, hardening, gloss, odourless, fast drying, and extending shelf life (in absence of refrigeration) etc. The product is clear and transparent and because of its very light color it can be soluble in alcoholic or water. Some of the very specific uses of the Bleached Shellacs are:

- As Paints (primer for plastic parts and plastic film)
- Aluminum industry (primer for Aluminum and Aluminum foils)
- Flexographic printing inks
- Pharmaceuticals (for coating of pills, tables and gel caps and coating for controlled release preparation)
- Confectionery (in coating of confections, chewing gums, marzipan chocolates, nutties, jelly- and coffee-beans etc)
- Binder for food marking and stamping inks and Binder for egg coating
- Barrier coating for processed food, vegetables, fruits and dry flowers
- Textiles (used as textile auxiliaries and felt hat stiffening agents)
- Cosmetics(used in hair spray, hair and lacquers, hair shampoos, and binder for mascara)
- Wood finishing (as binder for wood coatings and wood stains and as filler/sealer for porous surfaces and cracks)
- Antique frames for paintings and Wood polish (French polish)
- Fireworks and pyrotechnics (as binder for fireworks, matches etc and used in coating of magnesia Electric (as binder for lamp cements)
- Electronics (it is binder for insulation materials, serves as additive to moulding compounds. Mass coating for print-plates and is adhesive for SI-cells.)
- Grinding wheels (it is binder for additive of grinding wheels)
- Plastic (it is primer for plastic parts and films)

Dewaxed bleached shellac: The Dewaxed white shellac is used in the same way as any other grade of shellac. The major difference between this shellac and the others is that it is a bit harder, shines a bit brighter, is completely free from wax. Bleached Lac has super characteristics and qualities i.e. adhesive, binding, hardening, gloss, odorless. It has good film forming properties, a high gloss and excellent adhesion to various substrates including the human hair. It is non-toxic and physiologically harmless. Good solution can be obtained in ethanol and lower alcohols. It can also be dissolved in water by adding an alkali like Ammonia. It is compatible with many other resins, raw materials and additives used in cosmetics, pharmaceuticals and food formulations. Some of its very specific uses are:

- Coating of fruits and vegetables
- Coating in tablets & capsules
- Coating in confectionary
- Coating in aluminum foil, paper
- Coating in cosmetic industry
- In cosmetics, it is used in hair sprays (pump sprays or aerosol sprays, hair setting lotions, hair shampoos, mascara, eyeliners, nail polishes, lipsticks, and micro encapsulation by coacervation of fragrances and perfume oils.
- In food, it is used for coating of confections, chewing gum, candles, cakes, eggs, citrus fruits and apples, and printing inks for eggs and cheese.

Aleuritic Acid (Shellac Aleuritic Powder): Aleuritic Acid (9, 10, 16-trihydroxypalmitic acid), obtained from shellac by saponification, is a unique acid containing three hydroxyl groups of which two are of adjacent carbon atoms. Aleuritic Acid is white powder or granule. It is moderately soluble in hot water or lower alcohols (viz. methyl alcohol, ethyl alcohol, and isopropyl alcohol) and crystallizes out on cooling the solution. It is soluble in the lower alcohols such as methyl, ethyl and isopropyl alcohols. Technical grade Aleuritic Acid (purity 99%) a slight yellow and almost odourless solid. There is a continuous growing demand of Aleuritic acid in the fields of perfumery and pharmaceuticals due to it being an excellent starting material for the synthesis of civetone, ambrettolide, isoambrettolide etc, which have the musk like odour. Civetone is obtained from Shellac Aleuritic Acid. It is used for manufacturing of perfumes and is in lot of demand with perfume manufacturing companies in France, Italy, Germany, USA etc. Other suggested applications of Aleuritic acid are the following:

- Synthesis of Glucose monoaleuritate (a non-toxic non-hemolytic water-soluble compound) in medicine as an isocaloric substitute for dietary tripalmitin.

- Preparation of plastics with good adhesive properties by the condensation of Aleuritic acid with pithalic andydride and glycerin, rosin etc.
- Aleuritic acid esters used in the preparation of lacquers, plastics and fibres. As illustrated above, one could conclude that Lac is an essential product for many of the industrial application.

Demand Supply situation

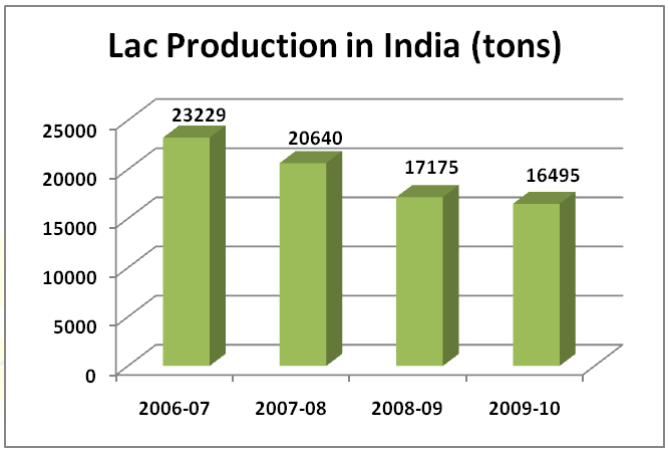
Supply Situation

World Production:

Lac is mainly produced in India, Thailand, Indonesia, parts of China, Myanmar, Philippines, Vietnam, Cambodia etc. India is a major producer and exporter of Lac with an estimated annual yield which has been hovering between 15000-20000 MT during the last one decade. India contributes about 60% followed by Thailand in world Lac trade.

India:

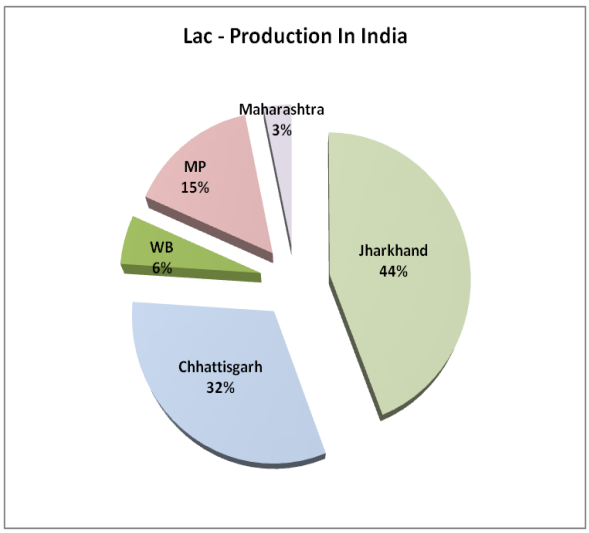
India is the largest producer of Lac in the world. It is estimated national production of Stick-Lac during 2009-10 was 16495 ton. The overall Lac production is reducing at rate 11% CAGR of in last five years.[3]

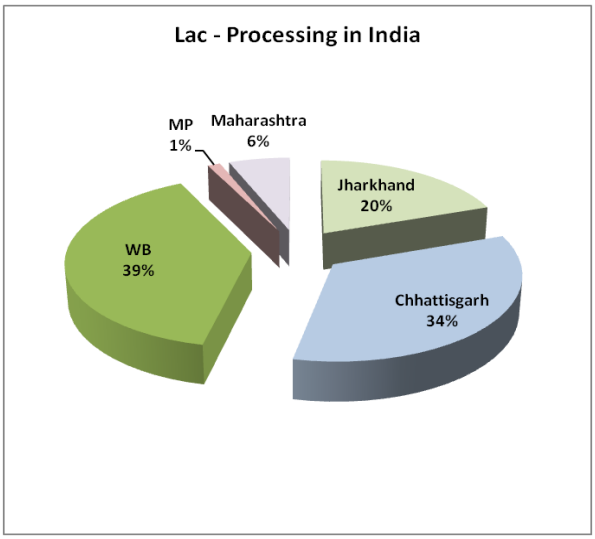


Jharkhand ranks 1st followed by Chhattisgarh, Madhya Pradesh, West Bengal and Maharashtra. These five states contributed around 95 per cent of the national Lac production.

The three key states for processing of Lac are West Bengal (WB), Chhattisgarh and Jharkhand. WBI ranks first for processing of Stick-Lacand contributes for 39% of the processing followed by Chhattisgarh with 34% share.

Major National production centers



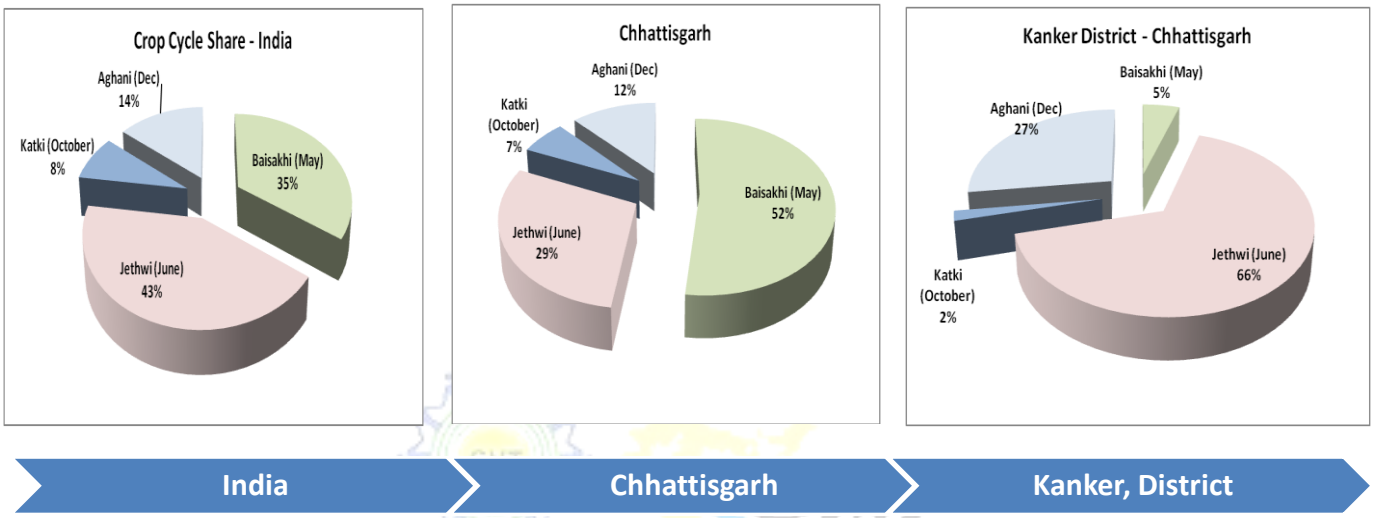


[3] Lac Statistics at a glance, 2010: Indian Institute of Natural Resins and Gums, Ranchi

State	% Share of processing capacity	Production Sites
West Bengal	39%	Balrampur, Jhalda, Tulin
Chhattisgarh	34%	Kothgora, Shakti, Dhamtari, Bhanupratappur
Jharkhand	20%	Khunti, Murhu, Bundu, Charkadharpur
Maharashtra	6%	Gondia

Crop cycle production[4]:

Jethwi (June – Kusumi Lac) and Baisakhi (May – Rangini Lac) are two main Lac crops of India. Together these contribute more than 75% of Lac production in India. In Chhattisgarh the share is further of these crops increased further with major contribution coming from Jethwi crop (Kusumi strain, June month). In Kanker district the contribution from Jethwi crop further increases to 66%, primarily due to availability of host trees for kusumi Lac and weather conditions.



Demand

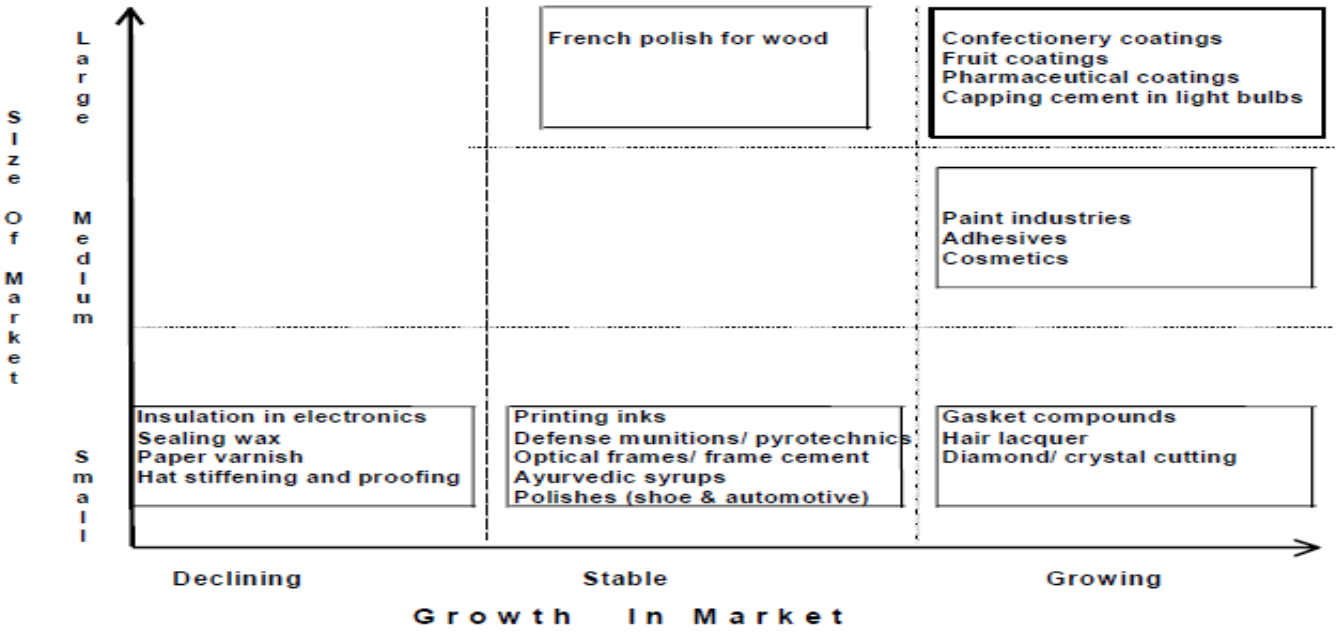
Shellac industry has taken a downturn after fall of Gramophone records industry in 80's, which used to be largest consumer of Lac. Later the demand for Lac gradually increased due its use in food and pharmaceutical industry as natural dye. Its use in paints and varnishes has also increased in 90's.

In the early-1990's the dawn of liberalization and free trade and a corresponding increase in the value of USD in respect of Indian rupee resulted in large amount of procurement of seed Lac from India by USA. The impact was a hike in price and rise of business volumes for Indian Lac. However, this momentary increase came to a halt as around 1996 when Thailand started offering the same seed Lac at a much cheaper rate to USA. The high production of the Baisakhi crop during India during 1997 resulted in a glut in Indian market and resulted in sharp price decline of seed Lac (Rs.34 from Rs. 85 per kg on chouri parta basis). The consecutive failure of production of Baisakhi crop (the major commercial crop of India) however helped the market to regain its stability.

The demand within India also saw an increase from 2000-2001 and it was soon to be realized that the indigenous production was insufficient to meet the domestic requirement. Attention shifted to imports and since then Indonesia came to the picture as a potential producing country and import of stick Lac from Indonesia to India started during the year 2000-01. Derivatives of Lac like wax and dye also find various industrial uses. In India, the fall in production of raw Lac has resulted in large scale import from Thailand. The imports steadily increased from as little as 100 M.T in 2000-01 to 6,450 M.T. during 2005-06 and touch to 8,500 M.T. during 2006-07. The current figures are over 12000 MT during 2009-10.

[4] ILRI, Ranchi: Lac statistics at a glance 2010

Strengths and Size of Markets for Lac based products[5]



Domestic consumption

As per a survey report from ILRI, Ranchi; Domestic consumption of processed Lac was estimated to be 2990 tons in 2009-10. Key industries which consumes Lac in India were

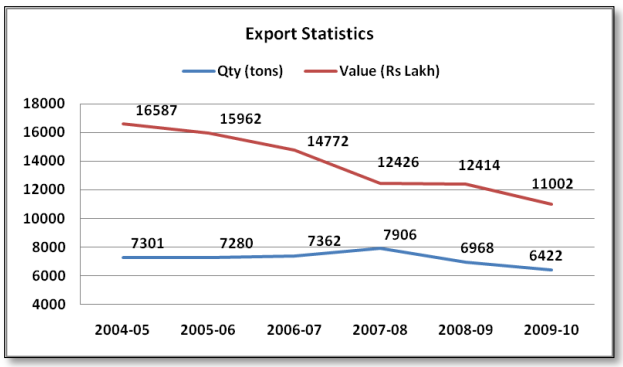
Name of Product	Approx Qty used (tons)	Key application area	Share of Area in consumption
Seeldlac/Shellac/Button Lac	2500	Paint and Varnish	58%
		Handicraft (Cottage)	20%
		Ornaments	5%
		Cosmetics	3%
		Bulb capping cement	4%
Bleached Lac	150	Colorless varnish	70%
		Pharmaceutical industries	15%
		Chocolate coating	5%
Aleuritic Acid	25	Perfume Industry	85%
		Cosmetic	10%
Dewaxed-decolorized Lac	100	Varnish	80%
		Fruit coating	5%
Gasket Shellac	150	Automobile Industry	40%
		Sanitary fitting	60%
Wax	15	Polish (Floor, Shoe, Auto)	70%
		Cosmetic	10%

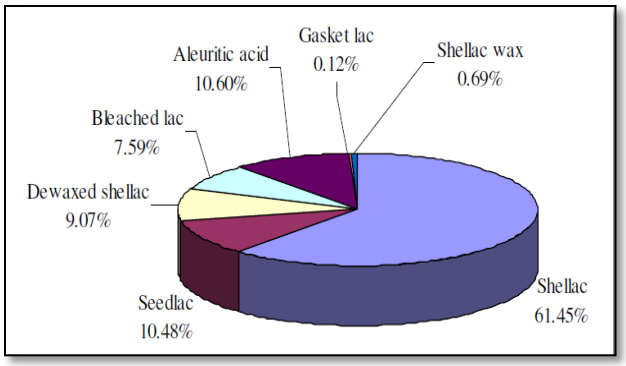
Export of Lac

The total export of Lac and its value added products during the year 2009-10 was 6422 tons valued Rs.110.23 cr[6]. Top five export markets for India are Bangladesh, USA, ARE, Indonesia and Germany.

[5] MPRLP website

[6] ILRI Ranchi: Lac statistics at a glance 2010; SHEFEXIL: A Statistical profile





Most of the Lac was exported in the form of shellac, followed by Aleuric acid and seed Lac.

Chhattisgarh – Statistics of Lac

Production:

Chhattisgarh is today the major contributor of raw Lac followed by Jharkhand. Lac cultivation is one of the important secondary sources of income for villagers and this is particularly more in the tribal districts. The important Lac producing areas in the state are Kanker, Korba, Rajnandgaon and Bilaspur. Most of the tribal population who live in or around forests was traditionally practicing Lac culture. Of late due to displacement of tribal population from forests has led to reduction in production. However those who own trees that are suitable for Lac still take up cultivation of Lac. Vagaries of weather especially change in temperature and heavy hailstorms during critical stages of insect life cycle effects the crop badly. This climatic uncertainty acts as a major deterrent for poor farmers to invest in this enterprise.

Processing

In Chhattisgarh, the processing centers are near to the places where the production happens. For instance the productions in Kanker and Bastar normally arrive at the processing centers of Dhamtari. Most of the processing centers are primarily involved with the first level of conversion i.e. Stick Lac to Seed Lac. There are however, a very few plants doing the industrial processing of Bleached Lac, Decolorized and dewaxed shellacs and Aleuritic acid. The table below lists major production centers in Chhattisgarh.[7]

Major Production Centres	No of units		Average Yearly Stick Lac Consumption (MT)	% of product for Export
	Large	Small		
Kothgora	6	-	3400	80 %
Shakti	3		400	50 %
Dhamtari	-	8	800	Nil

Processing units in Kanker

Unit	Capacity (Quintals/day)	Remarks
Tirkadand	1.4	Collaboration with Forest Department
Korar	1.4	Collaboration with Forest Department
Mordongri	1.4	Collaboration with Forest Department
Sarona	1.4	Collaboration with Forest Department
Sambalpur	4	Private
Gadpichwari, Kanker	4	Private

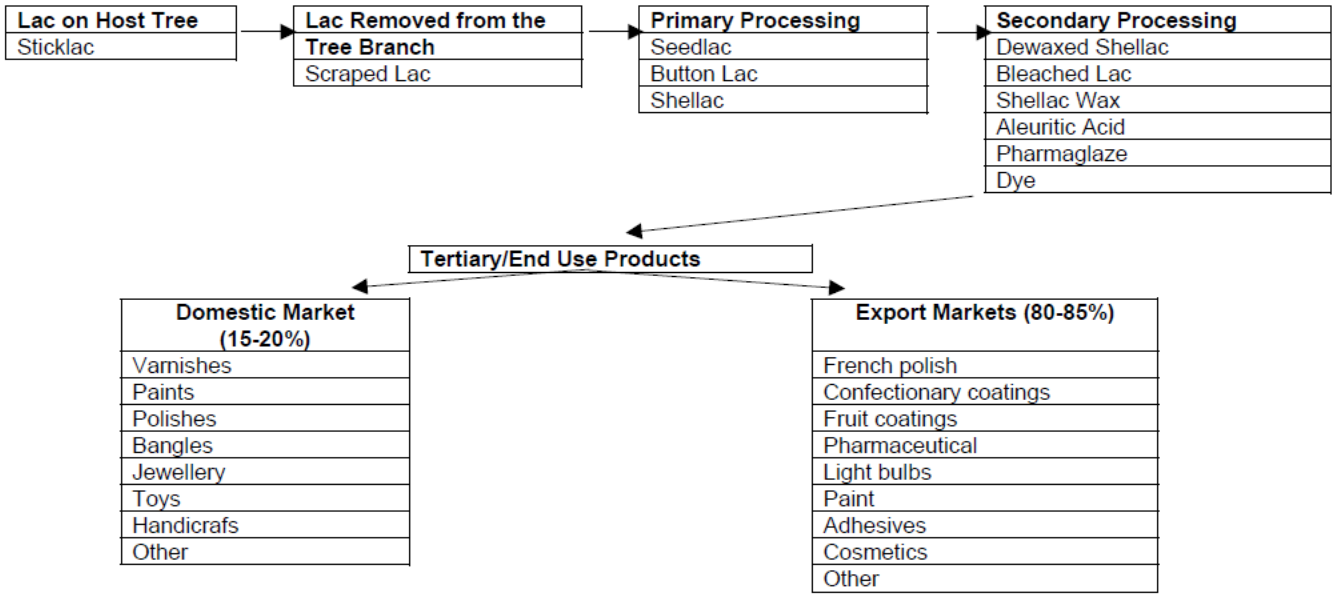
[7] Chhattisgarh State Institute for Rural Development, Raipur.

Conclusion on demand supply situation

The trend shows that the market is growing and so is the demand of the Shellac – both in the market within India and also in markets outside. The Indian manufacturers are also getting more vigilant to the standards required for supply of the food grade shellacs and are developing in-house capacity to abide by the standards. There is also a good demand of the shellac within India. The production on the other hand of Stick Lac has shown great variations across seasons and years. Failure of crop within the country has resulted in large scale imports of stick Lac from outside the country. The potentials therefore exist to promote productions within the country.

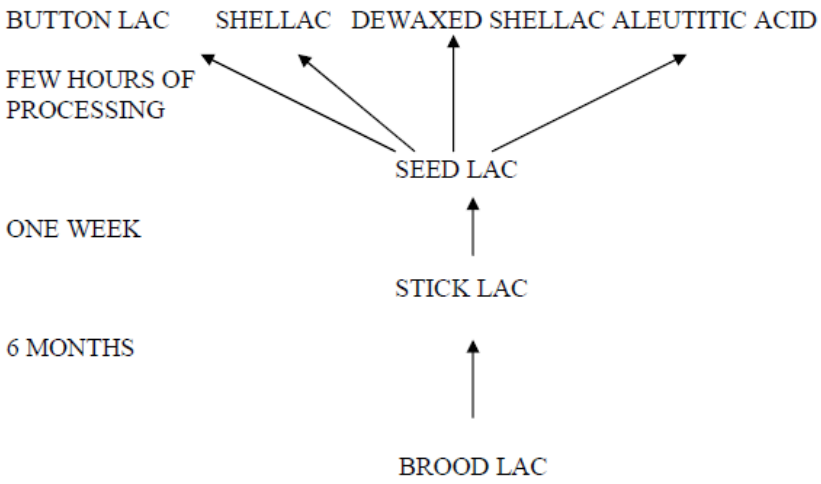
Lac Value Chain

Lac is collected by harvesting branches from the host plants. The product at that stage is called as stick Lac. The Lac when separated from the sticks of the host plant is known as scraped Lac. Scraped Lac is unstable and prone to moisture. It is processed to convert into a clean and more stable form through primary processing. Various products obtained in primary processing are seed Lac, button Lac and shellac. Produce of primary processing acts as raw material for secondary and tertiary processing of Lac.



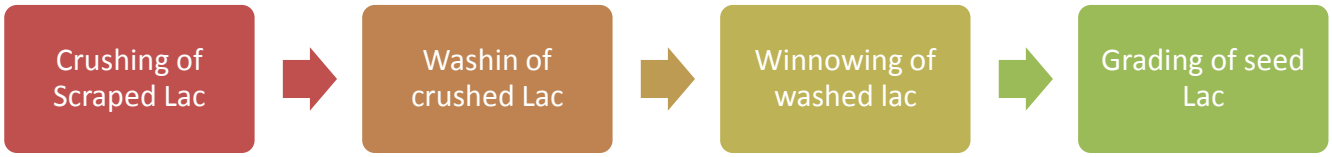
Lac – Value Chain

The time in which this value addition happens is shown in the diagram below.



Case of Value addition: **Conversion of scraped Lac to seed Lac**

The process of converting scraped Lac to seed Lac involves four simple processes.



The Stick-Lacis sieved by chaluni through 2 large flat sieve successively of increasing number (no. 3 to 8 – according to the quality of Stick-Lac) and thereafter crushed by crusher into small grains and the residue so left is called "garda". Successive sieving and crushing is required for higher grade product. Usually a crushing machine is used to crush the Stick Lac. However, before the next process is initiated the crushed item is sieved.

Machine for crushing scraped Lac

Machine to wash crushed Lac

Once the sieving is done the crushed stick Lac is fed by basket into a Barrel Washing Machine. The loading time taken is generally 15 - 20 minute. Different types of washing are done for different grades – Single Wash for Low quality, Double Wash for Medium quality and Triple Wash for Superior quality. This washing removes the 'blood' also called the dye from the Sick Lac and also removes other materials like the sand and the wood impurities. One cycle of washing usually takes around two to three hours to complete. The process uses a lot of water and the rotary device inside the barrel helps the churning of the stick Lac and helps in the cleaning process. The water that comes out of the barrel is often taken onto a field and is allowed to dry down. The contents are sometimes used as pesticides and fertilizers. However, the use is much restricted. The washing time and the methods adopted to do this improve the quality of the seed Lac. There are three types of washing done.

- **Single Wash**: This involves a simple washing without or with negligible amount of soda for some 45 minutes.
- **Double Wash**: Soda cleaning (750 gm. for 500 kg.) with low quantity of water for 20 minutes. Water is poured into the barrel from the top through pipe for about 25 minutes and stopped when colour of water passing through a 60 no. net at the back side of the barrel appears white.
- **Triple Wash**: Water cleaning for 20 minutes. Soda washing (1 kg for 500 kg material) for 1 hr (Superior quality) or 45 minutes (medium quality). Then again water cleaning for another 30 to 35 minutes. This is done till the water coming out of the barrel shows no pigment.

Triple wash which gives Lac of superior quality takes about 2.5 Hrs per shift. Triple wash gives maximum return.

After the completion of washing, the bottom part of the barrel is opened and the total mass is poured into a circular cemented basin (size of the basin depends upon the capacity of the washer). The masses thereafter are filtered through cloth (different quality of cloth is used for different grade). After removing 'Khari', 'Pati' from the mass, Seed Lac is collected and kept in the bamboo basket (this are now being replaced by baskets made of plastics- see photograph below). It still contains some impurities which are to be thereafter removed through a few more processes.

Washed seed Lac – Ready for drying

The Seed Lac is then spread into the open cement floor for drying. The layer of seed Lac is continuously rolled over the floor from one side to the other side with the help of a 'Patri' (a wooden flat strip having a long handle) for facilitating the drying. It was informed that on a average day the process of drying would take between an hour or two. Usually the washing should not go beyond 2 Pm so that the finished product is dried by the end of the day.

Winnowing and grading

After drying the washed seed Lac, winnowing machine is used to clean the seed Lac from dust. After winnowing, grading is done. Grade of seed Lac depends on

- Type of wash – Single wash, double wash, triple wash, Golden wash
- Size of seed – Thick seed sells at higher price

Winnowing Machine

Machine to grade Lac

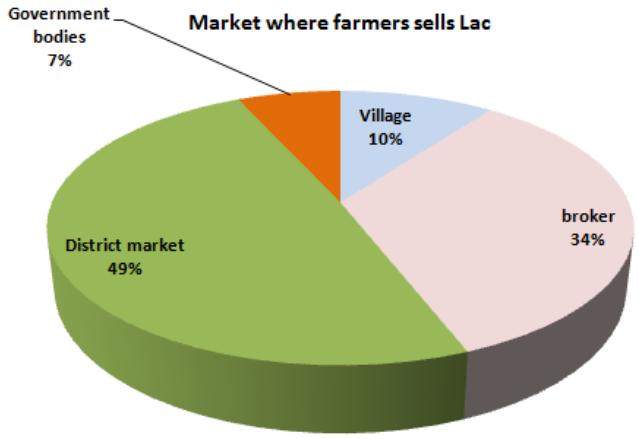
Machine to grade Lac uses different type of meshes to segregate different size of seed Lac particles. The biggest mesh used is 6-mesh; this means 1 square inch area has 6 holes. The more the number of holes per sq inch area, the poorer the grade of the Lac.

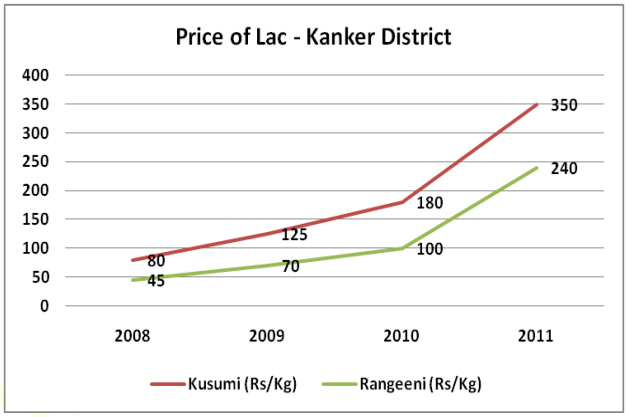
Lac - Market Analysis

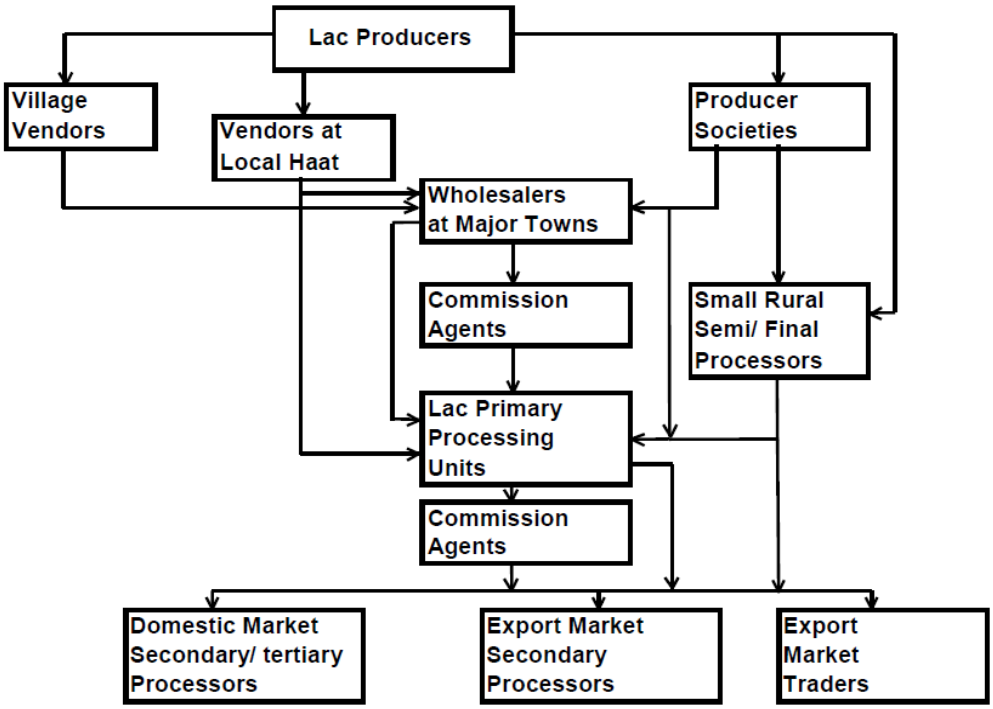
Lac is procured from farmers by a network of intermediaries operating at different levels of the market. The level involved in marketing of Lac can be summarized as

- Primary Market (Village Markets – Haats, e.g Halba market in the project area)
- Secondary Market (Mini assembling centers, e.g Narharpur Market in the project area)
- Wholesale Market (Large assembling centers, e.g Dhamtari market in the project area)
- Terminal Market (e.g. export market of Kolkata)

There is no mechanism of price regulation and it is driven by demand supply situations and exploited by eagerness and urgency of the farmer to sell the Lac and get the cash. Sometimes purchasers in primary market unite to fix a lower price. Field study indicates many farmers are aware of better prices in wholesale market but due to low quantity of Lac produced they sell it either in primary or secondary market. The primary survey results for market where farmers sell Lac are







The market chain and channels for Lac

Lac can go through up to approximately five intermediaries or "middle-men" before it is exported or is processed domestically. There is no government intervention to regulate prices in the chain. Market prices at each level in the chain depend on a complex mixture of:

- Variety of Lac (kusumi Lac sell at a higher price than Rangeeni Lac);
- Time of harvest;
- Perceived quality of the Lac (scraped Lac up to the point of primary processing; this includes the possibility of adulteration to increase weight);
- The volume being sold;
- The point of sale (at production village, local haat, major town or processing units) with allowances for transport to get to major Lac processing centers;
- Negotiating ability/ knowledge of seller and perceived urgency to sell;
- Traditional relationships between major trader/ processors and some producers and intermediaries; and
- The forward price outlook for the market.

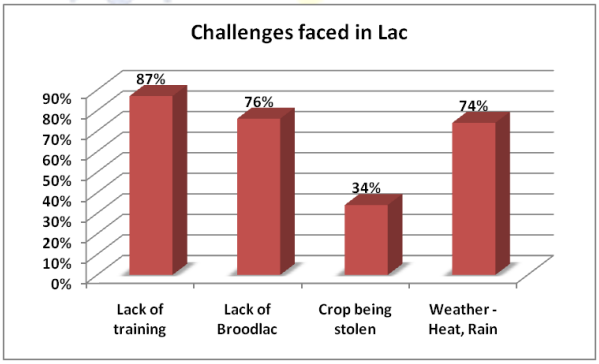
Challenges faced in Lac cultivation

The **primary survey** helped in identifying four key challenges which are faced by Lac cultivator.

Most common challenge was lack of training to cultivate Lac. 87% of the respondents cultivated Lac in traditional manner and which has resulted in crop failure. Many of them never used any pest control mechanism, proper pruning techniques and other advance methods for Lac cultivation. Only 13% people attended any training on Lac cultivation before.

Other key challenge faced by farmers is lack of brood Lac when their crop fails. Only 13% people were aware of or had accessed other source of obtaining brood Lac when they are not able to get it from their own crops or from any other farmer in the village.

Stealing of Lac crop was another major challenge faced by the farmers. Stealing happens usually in month of January when most of the farmers do not go to field for work.



Snapshots of Lac training in 4 sample villages

Thanabodi – Forest Dept

Hatka Charama - Private

Geet Paher - Private

CHAPTER V: ECONOMIC ANALYSIS OF LAC CULTIVATION AND VALUE ADDITION

Economic analysis of Lac cultivation of different host plants

A detailed analysis of Lac cultivation was performed.

Assumptions				
Fixed Cost	Quantity	Price	Cost	
Secateurs	3	210	630	
Big Knife	3	50	150	
Small Knife	3	35	105	
Ranking Sprayer	1	3500	3500	
Bucket	3	100	300	
Nylon bags	1000	1.5	1500	
Total Initial Fixed Cost			**6185**	
Loan taken			3093	
Interest rate			30%	per annum

		Unit	Kusum	Palas	Ber
1	Number of Trees		5	20	10
2	Average Yield per Kg of brood lac used	Kg	4	4	8
3	Quantity of Brood lac used per tree	Kg/tree	5	1.65	1.5
4	Labour Requirement				
	Initial Pruning	days/tree	1	0.3	0.67
	Marking, selection and innculation	days/tree	0.67	0.33	0.33
	Phunki removal	days/tree	0.2	0.1	0.1
	Pesticide	days/tree	0.2	0.1	0.1
	Harvesting and scraping	days/tree	1	0.3	0.67
	cutting and packing of Broodlac for sale	days/tree	1	0.3	0.5
	Total Labour days required	**days/tree**	**4.07**	**1.43**	**2.37**
5	Pesticide expences per tree	Rs/tree	200	100	100
6	Capacity of Nylon bag for innoculation	Kg/bag	0.1	0.1	0.1
7	Number of Nylon bags required per tree		50	16.5	15
8	Cost of Nylon bag	Rs/unit	1.5	1.5	1.5
9	Rent/depreciation for equipments	Rs/crop	619	619	619
10	Total Stick Lac obtained per tree		20	6.6	12
11	Proportion of harvest sold as brood lac		50%	20%	0%
12	Remaining harvest to be scraped	Kg/tree	10	5	12
13	Quantity of scraped lac obtained per tree	Kg/tree	7	3.696	8.4
14	Phunki obtained per tree		2	0.66	0.6
15	Price of Brood Lac	Rs/Kg	120	75	120
16	Price of scraped lac	Rs/Kg	150	90	125
17	Price of Phunki	Rs/Kg	75	45	60

Return analysis				
Revenue	Kusum	Palas	Ber-Kusumi	
Sale of Brood Lac	6000	1980	0	
Sale of Scraped Lac	5250	6652.8	10500	
Sale of Phunki	750	594	360	
Total Income	12000	9226.8	10860	
Expenses				
Cost of brood lac	3000	2475	1800	
Pestcide	1000	2000	1000	
Depriciation of equipments	619	619	619	
Interest	464	464	464	
Miscelleneous	500	500	500	
Total Expences	5582	6057	4382	
Net Profit	6418	3169	6478	
Profit per tree	**1284**	**158**	**648**	
Income per labour day	**315**	**111**	**273**	

Clearly Lac cultivation is highly attractive and Kusumi Lac proves most profitable.

Sensitivity analysis of income per day of labour has been performed on two parameter viz. yield of the tree per kg of brood used and average amount of brood which the tree can take. The price information for both brood and scraped Lac is varies proportionately also it varies a lot across seasons.

Kusum Tree **Yield of Brood Lac (production per Kg)**

315	2	4	6	8	10
Amount of brood used per tree (Kg) 2	-61	50	161	271	382
3	-27	138	304	470	636
4	6	227	448	669	890
5	39	315	592	868	1145

Palas Tree **Yield of Brood Lac (production per Kg)**

111	2	4	6	8	10
Amount of brood used per tree (Kg) 1	-74	18	109	201	292
1.5	-48	89	227	364	501
2	-22	161	344	527	710
2.5	4	232	461	690	918

Ber Tree **Yield of Brood Lac (production per Kg)**

273	4	6	8	10	12
Amount of brood used per tree (Kg) 1	-2	72	146	220	294
1.5	52	163	273	384	495
2	105	253	401	548	696
2.5	159	344	528	713	897

Parameter	Kusum	Palas	Ber/Kher	Samialata
Type of Lac strain	Kusumi	Rangeeni	Both Kusumi and Rangeeni	Both Kusumi and Rangeeni
Crop Cycle	Jan – June, June - Dec	Oct – May, May - Oct	July - Dec	July - Dec
Gap between two crops on same tree	12 – 15 months	6 months	6 months	6 months
Avg. brood used per tree	5 kg	1.5 Kg	1.5 Kg	20 gram
Average yield of scraped Lac	25 Kg	6 Kg	12 Kg	200 gram
Irrigation requirement	Low	Low	Very low	**Medium - High**
Availability of trees in region	high	medium	medium	Very low
Gestation period from planting to cultivation	12 years	6 – 7 years	5 – 6 years	2 years
Quality of Lac obtained	Best	Best	Medium	Medium
Annual Revenue per tree	2400	450	1100	Rs 30 (93000)
Annual cost per tree	1100	300	450	Rs 9 (27000/acre)
Annual profit per tree	Rs 1300	Rs 160	Rs 650	Rs 21 (66000/acre)
Return per labour day	Rs 315	**Rs 111**	Rs 273	-

Economic Analysis of converting scraped Lac to seed Lac

Key Assumptions:

- *Machine cost Rs 112000, Cost of construction of unit of size 1200 Sq feet @ Rs 800 per Sq feet.*
- *50% grant provided for initial cost or Grant provided =Rs 536000*
- *Machine setup with 35 Kg washing capacity per shift*
- *Machine runs 4 shifts a day,30 days a month for 5 months with 5 labours@3000 pm and 1 supervisor @5000 pm*
- *Cost of scraped Lac @ Rs 120/Kg;*
- *Yield of Grade A seed Lac by the raw material 65%, Yield for grade B seed Lac 5%*
- *Selling price for Grade A seed Lac @ Rs 208 /Kg, Grade B seed Lac @ Rs 187 /kg*
- *Rate of Interest @ 30% per annum,*

Based on the above assumptions the snapshot of Profit and loss statement for the machine will be

Revenue (Rs.)			
	Grade A Lac	3,036,150	
	Grade B Lac	210,600	
	Scrap	9,000	
	Total Revenue	**3,255,750**	
Expences (Rs.)			
Raw Material Cost			
	Scraped Lac	2,700,000	
	Washing soda	1,800	
	Cloth	1,000	
	Total raw material cost	2,702,800	**83%**
Labour Cost			
	Supervisor	25,000	
	Working Labour	75,000	
	Total Labour Cost	100,000	**3%**
Other Exp			
	Electricity	7,500	
	Miscelleneous	162,788	
	Interest	134,000	
Total Expences		3,107,088	
Net Profit		**148,663**	**5%**

Detailed financials are provided in Appendix3.

The key variables in the above statement are

- Initial grant provided to the unit
- Cost of Raw Material
- Capacity Utilization of the machines

Detailed analysis was performed with various scenarios on grants provided and corresponding sensitivities on cost of raw material and capacity utilization

Sensitivity Analysis

Secnario 1

No Grant Received

	(49,406)	50	75	100	120	150	175	200	225	250	275	300
100%	(209,578)	(129,492)	(49,406)	**14,663**	110,766	190,852	270,938	351,023	431,109	511,195	591,281	
90%	(226,450)	(154,373)	(82,296)	(24,634)	61,859	133,936	206,014	278,091	350,168	422,246	494,323	
80%	(243,323)	(179,254)	(115,185)	(63,930)	12,953	77,021	141,090	205,159	269,228	333,296	397,365	
70%	(260,195)	(204,135)	(148,074)	(103,226)	(35,954)	20,106	76,166	132,226	188,287	244,347	300,407	
60%	(277,067)	(229,015)	(180,964)	(142,523)	(84,861)	(36,809)	11,243	59,294	107,346	155,397	203,449	
50%	(293,939)	(253,896)	(213,853)	(181,819)	(133,767)	(93,724)	(53,681)	(13,638)	26,405	66,448	106,491	
40%	(310,811)	(278,777)	(246,743)	(221,115)	(182,674)	(150,639)	(118,605)	(86,571)	(54,536)	(22,502)	9,533	

Capacity

Secnario 2

Grant Received 25% or Rs 268000

Price of Raw Material

81,663	50	75	100	120	150	175	200	225	250	275	300
100%	(142,578)	(62,492)	17,594	**81,663**	177,766	257,852	337,938	418,023	498,109	578,195	658,281	
90%	(159,450)	(87,373)	(15,296)	42,366	128,859	200,936	273,014	345,091	417,168	489,246	561,323	
80%	(176,323)	(112,254)	(48,185)	3,070	79,953	144,021	208,090	272,159	336,228	400,296	464,365	
70%	(193,195)	(137,135)	(81,074)	(36,226)	31,046	87,106	143,166	199,226	255,287	311,347	367,407	
60%	(210,067)	(162,015)	(113,964)	(75,523)	(17,861)	30,191	78,243	126,294	174,346	222,397	270,449	
50%	(226,939)	(186,896)	(146,853)	(114,819)	(66,767)	(26,724)	13,319	53,362	93,405	133,448	173,491	
40%	(243,811)	(211,777)	(179,743)	(154,115)	(115,674)	(83,639)	(51,605)	(19,571)	12,464	44,498	76,533	

Capacity

Secnario 3

Grant Received 50% or Rs 536000

Price of Raw Material

148,663	50	75	100	120	150	175	200	225	250	275	300
100%	(75,578)	4,508	84,594	**148,663**	244,766	324,852	404,938	485,023	565,109	645,195	725,281	
90%	(92,450)	(20,373)	51,704	109,366	195,859	267,936	340,014	412,091	484,168	556,246	628,323	
80%	(109,323)	(45,254)	18,815	70,070	146,953	211,021	275,090	339,159	403,228	467,296	531,365	
70%	(126,195)	(70,135)	(14,074)	30,774	98,046	154,106	210,166	266,226	322,287	378,347	434,407	
60%	(143,067)	(95,015)	(46,964)	(8,523)	49,139	97,191	145,243	193,294	241,346	289,397	337,449	
50%	(159,939)	(119,896)	(79,853)	(47,819)	233	40,276	80,319	120,362	160,405	200,448	240,491	
40%	(176,811)	(144,777)	(112,743)	(87,115)	(48,674)	(16,639)	15,395	47,429	79,464	111,498	143,533	

Capacity

Secnario 4

Grant Received 75% or Rs 804000

Price of Raw Material

215,663	50	75	100	120	150	175	200	225	250	275	300
100%	(8,578)	71,508	151,594	215,663	311,766	391,852	471,938	552,023	632,109	712,195	792,281	
90%	(25,450)	46,627	118,704	176,366	262,859	334,936	407,014	479,091	551,168	623,246	695,323	
80%	(42,323)	21,746	85,815	137,070	213,953	278,021	342,090	406,159	470,228	534,296	598,365	
70%	(59,195)	(3,135)	52,926	97,774	165,046	221,106	277,166	333,226	389,287	445,347	501,407	
60%	(76,067)	(28,015)	20,036	58,478	116,139	164,191	212,243	260,294	308,346	356,397	404,449	
50%	(92,939)	(52,896)	(12,853)	19,181	67,233	107,276	147,319	187,362	227,405	267,448	307,491	
40%	(109,811)	(77,777)	(45,743)	(20,115)	18,326	50,361	82,395	114,429	146,464	178,498	210,533	

Capacity

Secnario 5

Grant Received 100% or 1072000

Price of Raw Material

282,663	50	75	100	120	150	175	200	225	250	275	300
100%	58,422	138,508	218,594	282,663	378,766	458,852	538,938	619,023	699,109	779,195	859,281	
90%	41,550	113,627	185,704	243,366	329,859	401,936	474,014	546,091	618,168	690,246	762,323	
80%	24,678	88,746	152,815	204,070	280,953	345,021	409,090	473,159	537,228	601,296	665,365	
70%	7,805	63,865	119,926	164,774	232,046	288,106	344,166	400,226	456,287	512,347	568,407	
60%	(9,067)	38,985	87,036	125,478	183,139	231,191	279,243	327,294	375,346	423,397	471,449	
50%	(25,939)	14,104	54,147	86,181	134,233	174,276	214,319	254,362	294,405	334,448	374,491	
40%	(42,811)	(10,777)	21,258	46,885	85,326	117,361	149,395	181,429	213,464	245,498	277,533	

Capacity

The sensitivity analysis clearly indicated the following points

1. CInI/GVT has to provide some minimum grant to make the venture safely profitable

100% Capacity Utilization translates to 225 quintal of scrap Lac or around 400 quintal stick Lac. Taking average per tree production of 25 Kg of stick Lac, this will require of harvest of 1600 Kusum trees. Considering average production of 80 Kg of scrap Lac, this will require production of 280 families

Total production of Lac in Kanker district in 2010 is estimated to be 8300 quintals. In terms of requirement this means the processing unit will require more than 2.5% of Kanker district production

At an average price of Rs 100 per Kg for input scraped Lac,

- The unit will not make sense if no grant is provided
- With 50% grant, the unit will breakeven at 74% capacity utilization or 166 quintals of scraped Lac or average production of 210 professionally cultivating families
- With 100% grant, the unit will breakeven at 34% capacity utilization or 76 quintals of scraped Lac or average production of 90 professionally cultivating families.

CHAPTER VI - SWOT ANALYSIS

SWOT Analysis

Strengths

A listing of the perceived strengths follows.

- Lac production has a long tradition in Charama (the project area) and the activity avoids many of the risks associated with "new" income earning activities. More than 97% of people have already cultivated Lac and more than 98% of people are willing to cultivate Lac.
- Support and focus by state of Chhattisgarh and forest department is a very big strength for Lac. The forest department with the help of grants from European commission is promoting Lac in the project area and kanker district.
- Input cash and labour requirement for the crop is very low as compared to return it generates.
- The project area has a generally favorable climate for production. The Kanker district in which the project area lies has traditionally been number one in Lac production for state of Chhattisgarh. In revenue terms the district still ranks number one due to large scale production of high value Kusumi Lac.
- It is not rain dependent and provides income at critical times of the year in rain-fed dependent agricultural areas.
- Export markets appear strong an unlikely to be seriously affected by an increase in production.
- In many cases surveyed, NTFPs are providing around 35% percent of rural household cash expenditure needs. Lac alone can take this figure to more than 50%.
- It is compatible with existing land based activities - minor shading does not appear to affect paddy production or any other crop production.

Weaknesses

A listing of the perceived weaknesses follows.

- Lac has significant **climatic risks** from heat, rain, hail and prolonged fog – up to 50 percent of the potential crop is commonly lost in poor seasons.
- Uptake (particularly by tribals) appears to be slow and requires technical training and follow-up technical assistance.
- There is normally a one year lead-time before significant income is received by producers.
- Brood Lac has often been in short supply and needs careful co-ordination and organized transport as timing is critical.
- Prices fluctuate up to +/-40 percent in one year with a lot of price manipulation by export traders.
- The shelf life of scraped Lac is short (max of two months without cooled storage conditions) so producers cannot easily hold back selling during low price periods.
- Trading practices work unfairly against producers with under weighing, unfair grading and opportunist pricing in many instances.
- Theft is a problem in most producing areas.
- Inoculation for the katki crop in July comes at a time when labour is short in some intensive agricultural cropping areas.

- No minimum price support or crop insurance schemes operate for Lac.
- No crop credit facilities exist for Lac producer input requirements.

Opportunities

A listing of the opportunities arising out of an expansion of Lac production follows.

- **Existing Host trees**: A forest department estimates that only 10% of host trees are being utilized for Lac cultivation. So there exist ample opportunities to grow Lac cultivation.
- **New Host plants for commercial production of Lac:** New host plants like samialata and galvan have been identified which are highly useful for commercial production of Lac. These plants grow very fast as compared to traditional Lac host plants viz. kusum and palas.
- **Existing Projects:** The existing initiatives taken in the project villages specially "Wadi project" where the NGO is targeting to create Wadi on more than 2000 acre of land in the project villages. In every Wadi the NGO is providing all kind of support to the beneficiary farmers to grow Mango, Cashew and lemon trees. The Lac cultivation can bring some synergy with Wadi project for collective effort and overall development.
- A favorable export market outlook with increasing interest in natural and sustainable products.
- Opportunity for some producers to specialize on brood Lac production.
- The opportunity to unify producers through support to encourage increased production, collective marketing and possibly processing.
- The opportunity to use Lac in conjunction with joint forest management (JFM) as a major forest conservation tool.

Threats

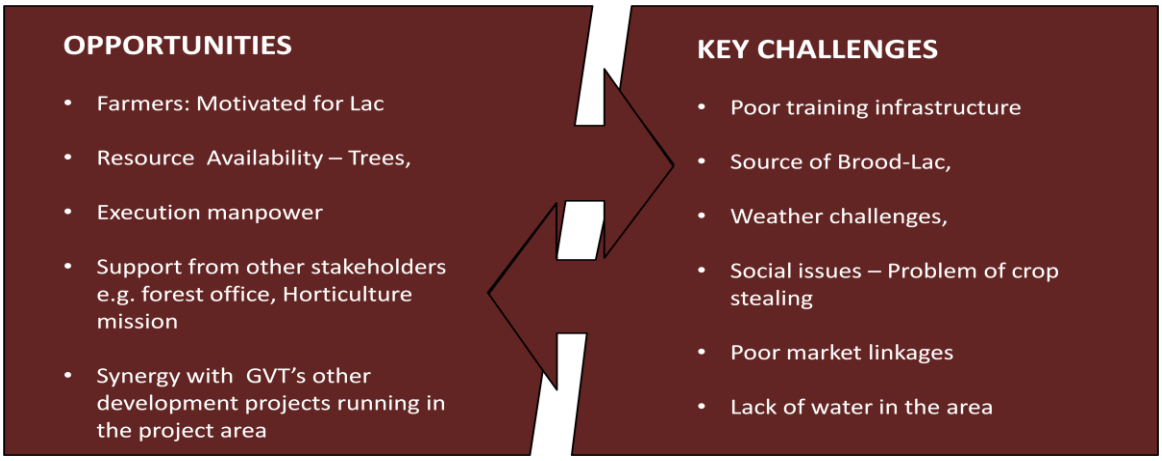
A listing of the perceived threats arising out of an expansion of Lac production follows.

- Variable climatic conditions specially rising temperature and sometimes heavy rains increases risk of crop failure.
- Other States in India could also quickly increase production and possibly threaten export market stability.
- Little is known about the Lac end uses and risks of substitution in export markets.
- Similarly little is known about the plans of other producing countries.
- A shortage of supply and high Lac export prices over the past 4 years are stated by exporters to have reduced market uptake in some markets and encouraged substitutes.

CHAPTER VII: RECOMMENDATIONS –STRATEGY ACTION AND ACTION PLAN

Opportunities and Challenges

Any strategy to promote Lac in the project villages needs to deal with few key issues and use available opportunities



Poor training infrastructure for Lac

87% of the respondents cited the problem of Lac of training in cultivating Lac through modern methods. There was also lack of trainer in the project area. Those who received training were not able to propagate it further in the village. Also lack of monitoring and feedback resulted in poor production in the next cycle as well.

Source of brood Lac

76% people didn't have access to Lac seeds due to previous crop failure. The untimely distribution from forest department also resulted in ineffective seeds. Only 13% people were aware of source of seeds other than self crop or from nearby farmers.

Weather challenges:

Lac production becomes very difficult once the temperature in month of summer crosses 42◦c. Also the production fails in excessive rain when the crop gets washed away in Lac of sunlight. A crop failure in one cycle leads to another major problem of source of seeds for the next cycle and the problems turns into a vicious cycle.

Social Issues:

- **Problem of Stealing of crop:** farmers face lot of problem protecting its crop from being stolen. Many times this happens during night time when there is no one to protect the crop

Market Linkages

Price of Lac fluctuates a lot in every season and across seasons as well. The kusumi Lac price in present season was more than 3 times the price of Lac in last season. The prime reason is demand supply gap also the ability of the farmer to negotiate with the level of production he has.

Synergy with existing efforts and long term vision: Support from existing projects running in the project area, support from other stakeholders (forest office) willing to promote Lac, available resources. Considering the challenges listed above the following strategies are recommended

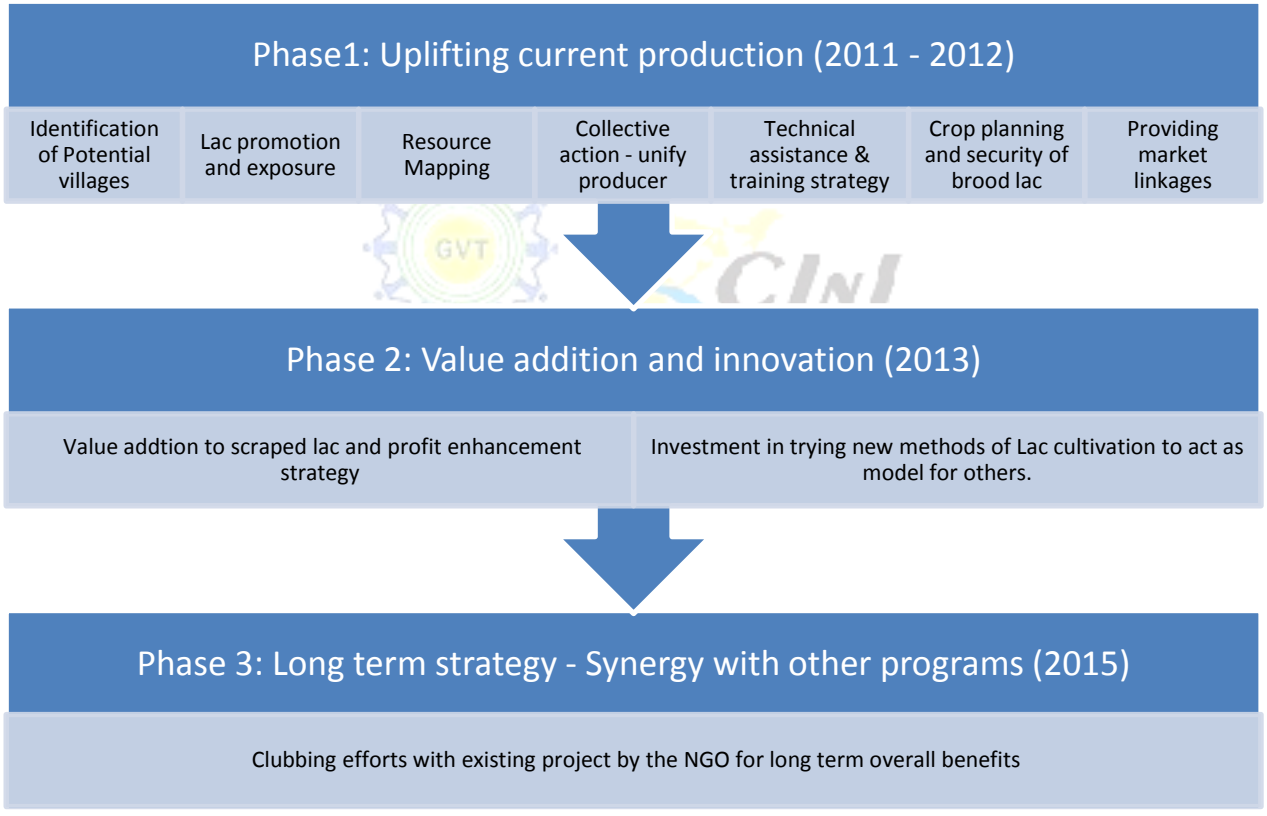
Recommended Strategy

The overall strategy for development of Lac is divided in three phases.

Phase 1 (2011 – 2012): This phase targets to improve the production level in the project area by efficiently utilizing existing resources, promoting advanced methods of Lac cultivation, providing skill based training and support for market linkages.

Phase2 (2013): This will be the value addition phase in which GVT can work with farmers to take the raw produce at next level in the value chain and sell seed Lac. Seed Lac sells at 70% premium to scraped Lac but to set up a new processing plant success of phase one is important as shown in the economics of Lac processing in previous section.

Phase2 (2015): This phase will ensure synergy between Lac promotion and Wadi project of GVT. In long run, Once the Wadi starts giving fruits people are expected to move towards their Wadis. At this time it will be highly useful if they have host plants in their Wadis to continue cultivating Lac as well. Since the Wadi model doesn't allow plantation of trees inside the Wadis, border plantations of Lac host tress is recommended. Ber plants can easily grow in rain-fed conditions and gives good amount of quality Lac per tree. The plantation needs to start now as Ber takes 3 years to grow before it can be cultivated for Lac. GVT can partner with National Horticulture Mission of central government to get financial support for border plantation and fencing.



Phase 1: Uplifting current production

The first and most important step to promote Lac based income generation in Charama block is uplifting current production level in the project villages. For this a four way strategy needs to be implemented. A brief snapshot of the recommended strategy, Model and list of interventions by GVT are summarized before the detailed explanation of each.

Strategies to Up-lift current production levels

Model	Identified Partners/Villages	Action performed/Current Status	Proposed Intervention for GVT
Strategy 1: Identify most potential villages for Lac			
• Survey • Forest department data • Field level experience of GVT members	• Kusumpani, Thanabodi, Hatka Charama, Geetpaher	• Survey for 116 farmers in 5 villages and analysis • Identified 4 potential villages	
Strategy 2: Promotion, Motivation and identification of interested farmers			
• Exposure Visits • Video based promotion	• *SHG in Tirkadand* • *SHG in Korar*	• Exposure visit of 100 farmers has been done before	• Promotion activities in identified villages • Exposure visit of select famers
Strategy 3: Resource Mapping			
• Mapping present resources as input to model	• GVT staff	• Resources of 116 farmers in identified villages are identified.	• Document number of trees each farmer has • Document location, size, type of every tree as well
Strategy 4: Unify producers in the identified villages			
• SHG • JLG	• Exposure Visit of select farmers in the identified villages to Tirkadand SHG.	• Promotion for group formation in three villages – Thanabodi, Hatka Charama, and Kusumpani	• Creation of SHGs in identified villages for Lac cultivation.
Strategy 5: Technical assistance and training strategy			
• Skill based training model • Monitoring progress • Collaboration with other agencies • Identification of Lac leaders – GVT field officers and Jankars should be expert on Lac cultivation and marketing • Incentive for training and communications from sales	• Mr. Thakur, Asst. Additional Director, NTFP, Forest Department, Kanker • Indian Lac research Institute, Ranchi. • Mr. Purushottam Mandavi, Sanjivini SHG, Tirkadand, Charama, Kanker	• Initiated partnership for joint efforts with Forest department • Performed Training on Lac cultivation in the village Thanabodi in partnership with forest department • Performed Training on Lac cultivation in 3 villages in partnership with SHG in Tirkadand	• Each training should aim at developing a particular skill of the farmer. e.g. Training only focusing on selection and pruning of trees. • Identify leader among the group and along with GVT jankar, the leader should ensure the farmers implement what they learnt • Build on partnership with forest department and conduct training on Lac in the identified villages • Providing Training to GVT community organizers and Jankars at ILRI Ranchi. • Identified GVT community organizers and jankars should be part of all the training being conducted in

			the villages.
Strategy 6: Crop planning and security for brood Lac			
• Coupe system of Lac cultivation where trees are grouped in different combination • Brood Nursery	• Mr. Purushottam Mandavi, Thanabodi • JFMC • Forest department	• With the help of forest department distributed material explaining coupe system in village Thanabodi • Prepared a manual explaining crop and brood Lac security	• As a part of training GVT to emphasize on promoting grouping of trees for Lac cultivation. • From the resource map Identify trees which are relatively insulated from excessive heat and rain to secure brood Lac for next crop • Creation of SHG for Brood nursery
Strategy 7: Providing Market linkages			
• Collective action and increasing bargaining power	• Forest department processing centers • Other processing centers in Chhattisgarh	• Mr Shakti, Expert on marketing of Lac in forest department	• Facilitate selling of Brood Lac as well as scraped Lac by providing market information to the famers.

The details for the strategies summarized in the table above are

Strategy 1: Identification of potential villages

First step is to identify most potential villages for Lac cultivation. This will help GVT focus its resources on few villages, test its development model and add capabilities. Further success stories in neighbor acts as best motivator to get involved in the development effort, so GVT needs to succeed in few most potential villages first. The study identifies four such villages viz. Kusumpani, Thanabodi, Hatka Charama, Geetpaher. The villages were shortlisted as per number of host trees, motivation level of farmers, and feedback from GVT field officers and forest department.

Strategy 2: Promotion, Motivation and identification of interested farmers

Exposure Visit

GVT should facilitate visit of farmers to the nearby SHGs which are successfully cultivating Lac in their villages. One such identified village is Tirkadand. Although GVT has already done such exposure visit earlier but it was done for farmers randomly picked from the villages. It is recommended it should be done again for selected farmers just before providing training to those farmers. This will help the famers to see the end result of training which they will undertake and actively participate and clear all doubts in the training sessions.

Creating models for new farming techniques

GVT should invest its time and effort in trying out new methods of Lac cultivation. The required technical support can be obtained by Indian Lac and Resin Institute (ILRI), Ranchi and Forest department, Kanker. GVT can nominate few members and farmers to undergo training at ILRI. Those trainees will be responsible to cultivate Lac through new methods on sample trees. On being successful this will act as motivating factors for nearby villagers to adopt new methods.

Identification of interested farmers

GVT needs to identify a set of motivated farmers from each village who will be focused on every development effort of Lac promotion in the villages. A simple way to assess the motivation is the number of times a farmer has appeared in previous training and motivational efforts. Further interview with each farmer who has attended GVT training programs can help to shortlist farmers who have resources and are keen to make a group and adopt new methods of Lac cultivation.

Strategy 3: Resource Mapping

Once GVT identifies the interested and motivated farmers, the next step is resource mapping of the farmers. Resource mapping identifies number, type, location, size and condition of every host tree the farmer owns. This is a critical step for three reasons

- ***To identify potential host trees which should be used for producing brood Lac only***

A Tree in valley

A Tree near water body

The temperature in Charama block touches 45◦c mark in summers. In such temperature it is important to save brood Lac for the next crop. A tree in a valley or near water body has access to higher moisture content. Such trees should be identified for Jethwi (Jan – June) cycle of Lac production and should be used to cultivate brood Lac.

In rainy season (July to Dec crop cycle) tree on hill top and open area should be used to cultivate Lac as such trees gets more sunlight and are more insulated from effects of heavy rain which sometimes destroys Lac crop.

- ***To estimate the amount to brood that will be required for next crop***

The resource map only can tell amount of brood Lac which will be required for next cycle. Amount of brood Lac depends on number and size of trees available for the next crop.

- ***To monitor the progress and assess the impact of GVT's intervention in the villages.***

A resource map which is continuously updated with the processing done on trees helps to monitor the progress made by the farmers. One such example could be grouping of trees and counting number of trees which are pruned by the farmers after training on pruning. Resource map also helps to understand the reasons of over or under production in the village setting and thus farmers and GVT can adjust its recommendations depending on the changing local condition for Lac production.

Strategy 4: Collective Action – Unify producers

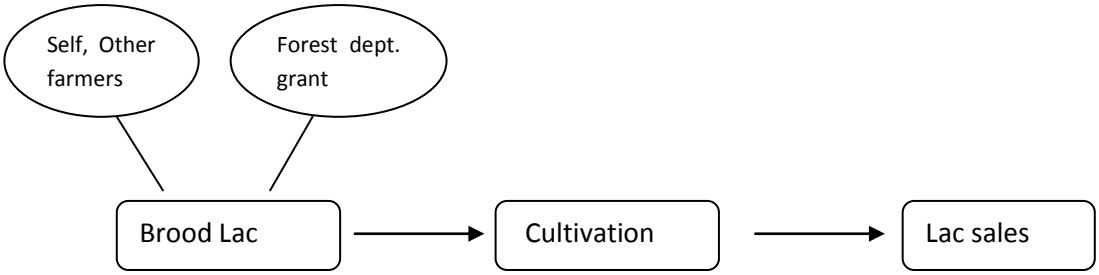
The problem of crop stealing, better pricing of crop and resource sharing can be hit with one stone by creating groups of farmers. Collective action through means of SHG/JLG can help farmers to unite their resources to obtain necessary loans and grants from various bodies. Forest department also provides essential equipments like spray machines, pruning tools etc to groups of farmers. Group formation helps to protect each other's crop from being stolen. One person can monitor

many trees at a time so the extent of labor required is less; further the group can act together in case of an incidence of crop stealing.

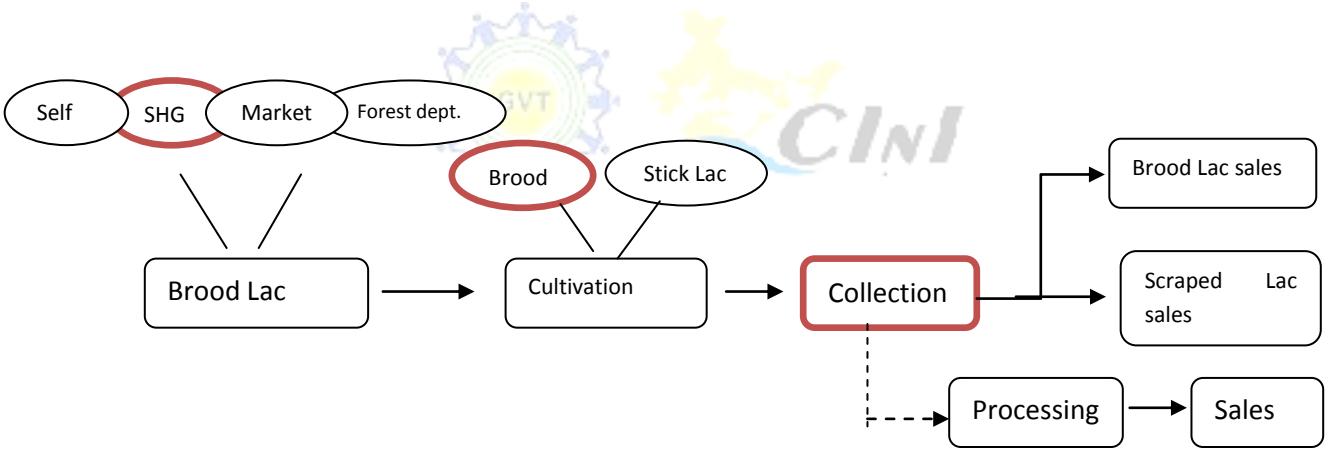
Farmers in the group can collect their produce and sell together to large processors directly to obtain better prices for their produce. Further Forest department also places large orders to groups rather than individual farmers.

GVT should create a group for establishing brood Lac nursery. This nursery should have access to trees which are suitable for brood Lac cultivation and should focus on producing different types of brood Lac on the trees.

GVT can intervene to create groups of farmers for Lac cultivation. The group should be actively provided with all the trainings and support. Further the master trainer should act in sync with all the groups and manage those in the village.



Existing Situation in Villages



Proposed model under collective action

Strategy5: Technical assistance and training strategy

In the primary survey 87% people responded with Lac of training to be one of the important reasons for their crop failure. Training in four villages in the project area was conducted as a part of the study. The training was provided both by private trainer and trainer from forest department.

It was observed the existing training system has inherent weaknesses and it was observed many farmers just attend the training but are not able to implement it in the field due to lack of follow up and unavailability of trainer when the farmer has doubts to clarify. In the present training system a Lac expert from outside e.g. trainer from forest department comes and delivers a lecture on Lac cultivation to a group of farmers. Sometimes the lecture is clubbed with field level exposure when the trainer demonstrates the activity. Everything about Lac farming is told in one training session and no printed material is distributed to farmers. The training ends with questions of any particular problem farmers faces and signature on attendance sheet.

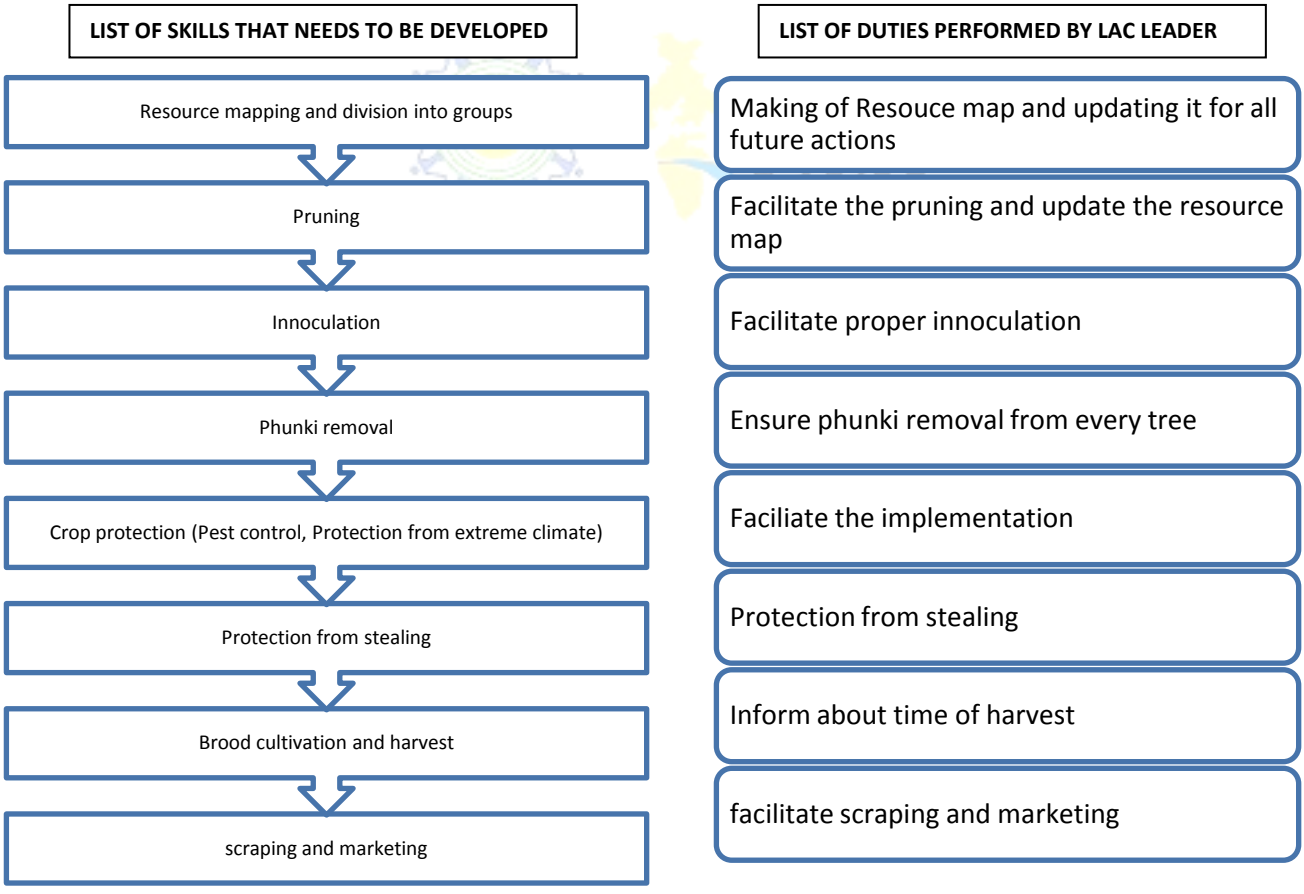
In such a system the farmer doesn't develop any new skill and to teach a new methodology skill development is of paramount importance. The system doesn't involve anything to monitor the effect or usefulness of the training and becomes an exercise of putting a tick on promotion activity that needs to be done. Further the village still largely depends on external trainer who will not be available when the farmer is actually trying to implement what he retains from the session.

A new more accountable method of training is proposed which has few key elements

- Focus on a skill development in every training session rather than giving knowledge about everything in one shot.
- Monitoring the progress made by farmers by keeping track of how many farmers used the skill developed
- Developing a training infrastructure in the village by which farmers learns from each other and become less dependent on external trainer.

Recommendation1: Skill based training

Modern methods of Lac cultivation requires nine steps to be followed by farmers. In present training methods in the villages all the steps are told to a bunch of farmers and effective retention is very less. Further due to lack of follow up no one actually implement the steps. It is recommended GVT to provide separate training to develop skills for every step and facilitate effective follow up after every training session. For purpose of monitoring GVT should identify a Lac leader in every group and incentivize him to ensure proper implementation of the training in the village and maintenance of records and resource map.



The Lac leaders will be face of GVT Lac efforts in the village. These trainers can be Jankars of GVT, other interested farmers or local enterprising youths in the village. These selected Lac leaders should be provided extensive training on Lac

cultivation and should be made part of any Lac training activity in the project villages. These trainers then should ensure implementation of every skill based training provided to the farmers in the village. For example, once the training of pruning methodology is given to farmers, Lac leaders will facilitate its implementation in the trained farmers. He will also keep a record of his activities.

The Responsibilities of Lac leaders are proposed to be:

- Each master trainer will facilitate implementation of training among the farmers.
- Lac leaders should maintain records of host trees of each of the trainees/growers.
- Lac leaders should plan, notify and collect their brood Lac requirements in advance of the inoculation season.
- They should offer technical guidance on all aspects of Lac production including choice of trees, pruning, and inoculation, Control of pests / diseases, timing of Lac removal and drying.
- Provide regular market information to the growers.
- Arrange the sale of brood/ raw Lac.
- Encourage the formation into societies and/ or companies for collective marketing and co-ordination of brood Lac.

Incentives of Lac Leaders

- Recognition of being known as Lac Leader in the village.
- Per farmer fee for ensuring implementation and record keeping
- A small % share of additional produce or profit on successful crop cultivated using new methods.

Recommendation 2: Collaboration with other agencies

To reduce the cost of developing training infrastructure and better management GVT should collaborate with other agencies active in the region. An agency like forest department have yearly budget to promote training on Lac in the villages. Regular interaction with officials in forest department reflected the interest from forest department for collaborative actions on Lac training. Such initiatives can be taken forward in future as well.

Recommendation 3: Improvement in training content

The existing training methodology can be improved to be more effective. The following improvements are recommended

- Distribution of pamphlets, pictorial training books to the farmers which they can refer to post training
- Making filed level practical exposure integral part of every training
- Use of Audio visuals to motivate farmers in the training
- Involvement of women in training – A lot of the field work is done by women so it is important to ensure presence of women trainees.

Strategy 6: Crop planning and security for brood-Lac

Coupe system of Lac cultivation where trees are grouped in different combination

This system provides the needed rest to the host plants and allows it to regenerate the fresh twigs. Following one harvest, some trees are made to rest and recoup the lost vigor, while other trees (which have till now been restring) are ready with

succulent twigs for inoculation. The underlying principle in improved method of Lac cultivation is to provide much needed rest to the host plants after a harvest has been taken.

The practical way to implement this system begins with marking all the trees with numbers and clubbing them in groups. The marked trees are then pruned at proper time as per the combination in various groups, so that after every harvest, new ready trees are available for inoculation for next cycle.

Securing brood-Lac requirement for next crop

Setting up brood nursery: Brood is one of the key challenges faced by farmers throughout the Lac cultivating communities. GVT should ensure the availability of brood for crops. One of the recommended ways to ensure brood availability is setting up an SHG/JLG which cultivated brood Lac only. Such group should have necessary host plants of all types and at location where brood is production is safe. Extensive training on brood cultivation should be provided to this group and it should cultivate brood of different varieties. e.g. Kusumi brood on Ber as well as Kusum plants. Also Kusumi brood from initial seeds brought by different states to ensure availability of different types of brood.

Apart from setting up SHGs GVT should also train all the farmers for brood security. Due to vagaries in climatic conditions, rising temperature and rainfall most of the host plant gives only one commercial scale production in one year. For example Kusum tree gives commercial scale production in June – July but the winter crop which is harvested in Jan gives very less production. So in this scenario it is essential to secure brood Lac in winter crop cycle for the next summer crop. It is recommended that GVT should promote cultivation of brood Lac on trees which are near to some water body or in area where they are in shades of nearby trees and hence not exposed to extreme temperature.

Strategy 7: Providing market linkages

It is recommended GVT to partner with agencies like forest department, Lac processing center Tirkadand etc for collective promotion and marketing of Lac. Presently forest department in running a project under grants received from European Commission to promote Lac in identified villages in Kanker district. Under that, the department is providing training, seeds and equipments to farmers in the villages. Some of the project villages like Hatka charama, Thanabodi are common to both GVT project and forest department project. GVT can partner with forest department and put a joint effort to promote Lac.

Phase 2: Value addition

With the fruitful results of successful phase one, GVT can look forward to implement phase two of Lac development program. The precondition for value addition phase two is success of phase one as we saw in the sensitivity analysis of value addition; machines operating below capacity may make losses.

Presently most of the Lac is sold by tribal in form of scraped Lac, which is nothing but Lac scraped from the sticks of host plants post harvest. Scraped Lac is not very stable and it becomes very hard and useless if it is not preserved properly. One need to carefully dry the scraped Lac before storing and the stored Lac should be stored in proper conditions and care. With proper storing the scraped Lac can be easily stored for 4 -5 months. The price of scrap Lac fluctuates very frequently in the market. At first level Farmers can trained to store scraped Lac and sell it when the market conditions are good.

Second level of value addition is converting scrap Lac to seed Lac. Seed Lac is refined form of scraped Lac and is obtained after crushing, washing, winnowing and grading scraped Lac. The price of scrap Lac depends on its grade and market conditions. In Chhattisgarh the indicative market price for scraped and seed Lac were

Product	Market Prices (Rs/Kg) in Jan 2011		Market Prices (Rs/Kg) in Jan 2010	
	Kusumi Lac	Rangeeni Lac	Kusumi Lac	Rangeeni Lac
Scraped Lac	350	250	150	85
Seed Lac	600	380	550	210

The forest department tried to set MSP for scraped Lac but it couldn't be implemented. Since the market prices fluctuates a lot and scraped Lac is cannot be stored for long, it may make much more sense to convert scraped Lac to seed Lac and then sell in market.

Some identified challenges in value addition are

- **Existing overcapacity of Lac processing in Chhattisgarh**: Due to the overcapacity farmers may not be able to buy scrap Lac at prices at which the unit makes economic sense.
- **Problem with small washers**: Small processing centers e.g. washers with capacity of 1.5 quintal per day gives inefficient washing. With multiple turns in the small washer, smaller Lac particles get washed away with sand and impurities. Thus the overall yield from scraped Lac to seed Lac reduces due to small washer.
- **Tribal families' inexperience in processing**.

Considering the above three challenges and market attractiveness of value added seed Lac, It is recommended GVT should set up processing unit once the production level in the villages improves to run the unit at 100% capacity. Further the village first should rely on manual washing techniques before setting up a automated plant. This will help farmers gain expertise in washing.

Trying new models for Lac cultivation

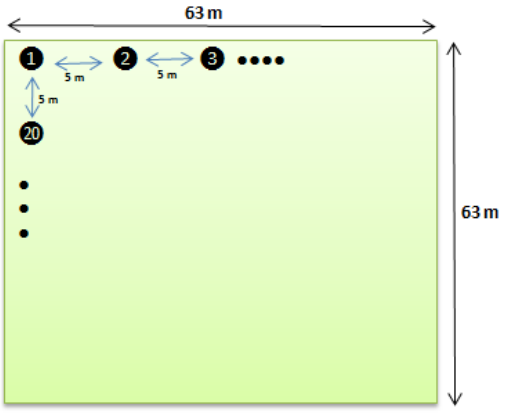
With change in weather conditions tribal in Charama block are facing problems of crop failure. The ability of farmers to take risk of trying new Lac cultivation methods at field level is very limited. GVT in partnership with institutions like ILRI, Ranchi; forest department and other NGOs can try new methods of Lac cultivation on some sample trees. The initiatives can range from small interventions like providing net above small trees when temperature rises to big changes like trying out new host plants in this climate.

Phase 3: Long term Strategy

It is recommended GVT should streamline its effort in various development schemes in the project villages. Presently GVT has undertaken a project to implement 2000 acre of Wadi (plantation of Mango, Cashew and Lemon with intercropping with vegetables) in the project villages. It has already implemented 1000 acre of Wadi in the project villages and another 1000 acre is expected to be completed by March 2012. Another important project which GVT has already received the funding is water harvesting and watershed development in the project area.

In long run interventions in Lac development can be planned along with these development efforts. Another reason to streamline effort is expected movement of farmers towards their Wadi's once the plants in Wadi start giving fruits. This phenomenon has been experienced in other places where Wadi projects have been implemented. In such a situation the farmers who are moving towards the Wadi will require Lac host trees in Wadi. Some recommendations for the same are

- **Border plantation of Ber trees in GVT Wadi:**
  - Ber grows easily in dry conditions
  - Due to its thrown it acts as a good border plant.
  - Ber takes very less time to grow and become ready for Lac. The crop cycle (July to December) in which ber gives Lac is relatively more insulated from heat.
  - It can act as host plant for both Kusumi Lac and Rangini Lac. The farmer can chose the strain as per demand in the market at that time.
  - After 5-6 years post plantation ber can be used to cultivate Lac. This life is suitable as the existing



plantations in Wadi will just start giving fruits by that time.

Financial support for planting Ber trees can be obtained from National Horticulture Mission of central government. The scheme provides financial support for plantations, irrigation development and fencing of trees. This will reduce financial cost to GVT and CInI.

Per tree profit from a Ber tree is estimated to be Rs 650[8]. On an average with 5 meters distance between a pair of Ber plants 20 trees can be planted on the border of one acre Wadi. This will translate of a profit of Rs 13000 per acre per annum.

The present model of Wadi will not let sufficient sunlight to fall between two mango or cashew trees, it is not recommended to grow any trees in between planted trees in Wadi.

[8] Refer to chapter VII: Economic analysis of Lac cultivation and value addition

Key Risk and Risk Mitigation

S.No	Risk/Challenges	Mitigation Strategy
1	Extreme weather fluctuations which leads to crop failures	• Trees selection: Focus on saving brood Lac for next crop • Water sprinkle in excessive heat • Growing new plants in shades and near water bodies
2	Possible conflicts which might arise in case host trees from common land are used.	• Agreement with JFMC to take host trees on lease
3	Adopting new methodology with local modifications	• The net in which brood is tied to tree sometimes get blocked due to fungus in rainy season. In such cases the net should not be used • The spray of pesticides requires around 30 liters of water per Kusum tree and around 10 liters of water per Palas tree. In a situation where water is not available GVT might need to intervene and provide necessary water.
4	Keeping farmers motivated to work on modern methodologies of Lac cultivation.	• Continuous promotion and motivation campaigns ○ Video shows, Exposure visit • Identify select farmers in few villages and begin project with those few motivated farmers • Providing credit facilities to interested farmers.
5	Problem of crop being stolen	• Crop protection by joint efforts of farmers. Farmers protecting the crop by working in group
6	Market prices fluctuations	• Active involvement in providing market information • Planting trees on which both type of Lac can be cultivated • Value addition from scraped Lac to seed Lac which can be stored for longer duration. • Work with forest department to set up MSP for Lac

CHAPTER VIII –COST INVOLVED FOR GVT AND EXPRECTED BENEFITS FOR FARMERS

Action plan summary

The action plan for GVT is summarized below

- Exposure visit of selected farmers from the identified four villages to Tirkadand SHG
- Identification of motivated farmers from the exposure visit and providing them training on selection and pruning of Lac host trees
- Identification of Lac leader from every village
- Creation of resource map of the farmers
- Planning training sessions with forest department.
- 7 days extensive training of Lac leaders and GVT CO at ILRI, Raipur.
- Other Skill based trainings of farmers who have successfully implemented pruning of their trees
- Establishment of brood Lac nursery in with one group
- Creation of groups of farmers for collective action
- Providing Brood Lac on loan to the created group for first time.
- Providing equipment s for Lac cultivation at subsidized rates to the group
- Monitoring the process, progress and record keeping.
- Identify farmers for next year.
- Collecting brood Lac back from farmers once the crop is ready and distribution of this brood to new beneficiaries
- Provide market information and linkages to the SHG

Cost involved and expected benefit for farmers

Key assumptions for cost involved per village is summarized below

	Assumptions				
1	No of beneficiaries farmers in village in year 1	20			
2	No of new beneficiaries farmers in village in year 2	40			
3	A farmer on an average has 3 Kusum and 10 Ber/Kher tree				
		Year 1		*Year 2*	
		Kusum	Ber/Kher	Kusum	Ber/Kher
	No of trees	60	200	120	400
4	**Cost of equipments for a set of 20 farmers**				
	Secateurs	10	210	2100	
	Big Knife	10	50	500	
	Small Knife	30	35	1050	
	Ranking Sprayer	1	3500	3500	
	Bucket	10	100	1000	
	Nylon bags	6000	1.5	9000	
	Total cost of equipments			**17150**	
5	**Cost of training**				
	Cost of printing material per farmer	15			
	Trainer cost per farmer (Rs 500 per training)	20	*(every seesion has 25 farmers)*		
	Number of training provided in an year	10			
	Cost of training of GVT CO and Lac leader	4400	*(cost per person for 1 week training at ILRI, ranchi = 2200)*		
6	**Salary of Lac leader in the village**	500	per month		
7	**Cost of Brood Lac given on loan to farmers**				
	Brood lac given per farmer	8	Kg		
	Price of brood Lac	220	Rs/Kg		
	Total Cost per farmer	1760			
	Rate at which farmer return the brood	1.25	*1.25 Kg brood returned for every Kg of brood taken*		
8	**Conversion rate of exposure visit to motivated farmers**	20%			
9	**Converstion rate from training 1 to training 2**	50%			

Other assumptions

- **There will be no requirement of exposure visit in the same village after success of year1**
- **50% farmers are expected to return brood next year**

	Cost sheet	
	20 farmers	40 farmers
	Year 1	**Year 2**
1 **Cost of exposure visit**	5000	0
2 **Cost of printed material**		
Training 1: Tree selection and pruning	600	1200
Training 2 to Training 6	3000	6000
3 **Cost of Training**		
Training 1: Tree selection and pruning	2000	4000
Training 2 to Training 6	4000	8000
Training of Lac leader and GVT CO at ILRI	4400	0
4 **Cost of Equipments**	17150	34300
5 **Cost of Brood**	35200	48400
6 **Administrative cost**		
Cost of salary to Lac Leader	6000	6000
Other Admin cost	10000	10000
Total Cost	**87350**	**117900**
Program cost per family	*4368*	*2948*
Expected Income increase per familiy in stable state	*10330*	
Time to achieve stable state	*1.5 yrs*	

CHAPTER IX – SCOPE FOR FURTHER STUDY

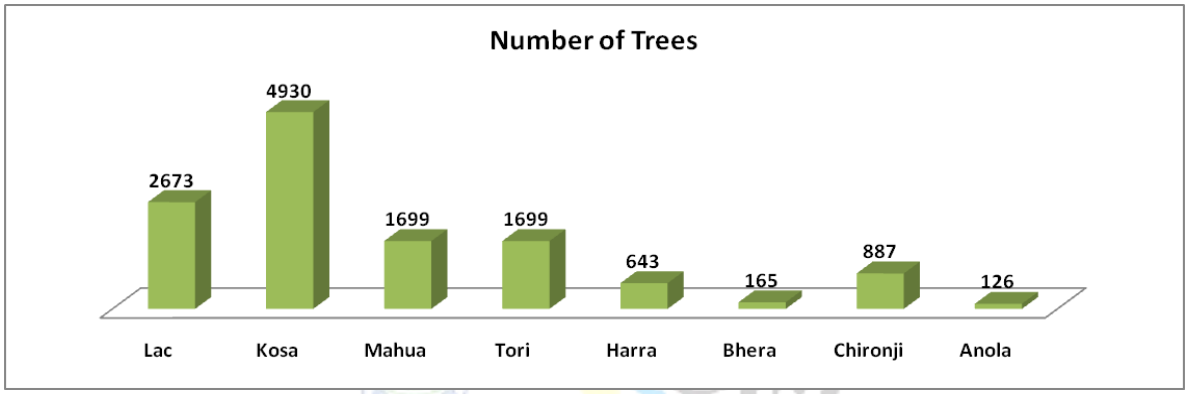
The study indicates the potential of Kosa and Mahua in the region. A deliberate attempt was made during the study to understand what interventions can be done to promote income generation from Mahua and Kosa in the project villages.

Kosa

Kosa (Tasar) is a type of silk. Tasar silk activity (cocoon to finished fabrics) is concentrated in Jharkhand, Chattisgarh, Madhya Pradesh, Maharashtra, West Bengal, Bihar, Orissa and Andhra Pradesh. The primary food plants of Tasar silkworm are Terminalia arjuna (Arjun) and Terminalia tomentosa (Saja) and secondary food plants are Lendia, Dhara and Zizyphus. These plants are present in abundance in the project villages and Kosa can prove to be good source of income for the tribal families in the project area.

Opportunities for Kosa

- **Presence of host plants**: Survey of 116 families in five villages indicates more than 40 host plants per family. Arjun and saja trees grow very quickly in the region. Most of the trees are in the waste land which is many times far from the main revenue land



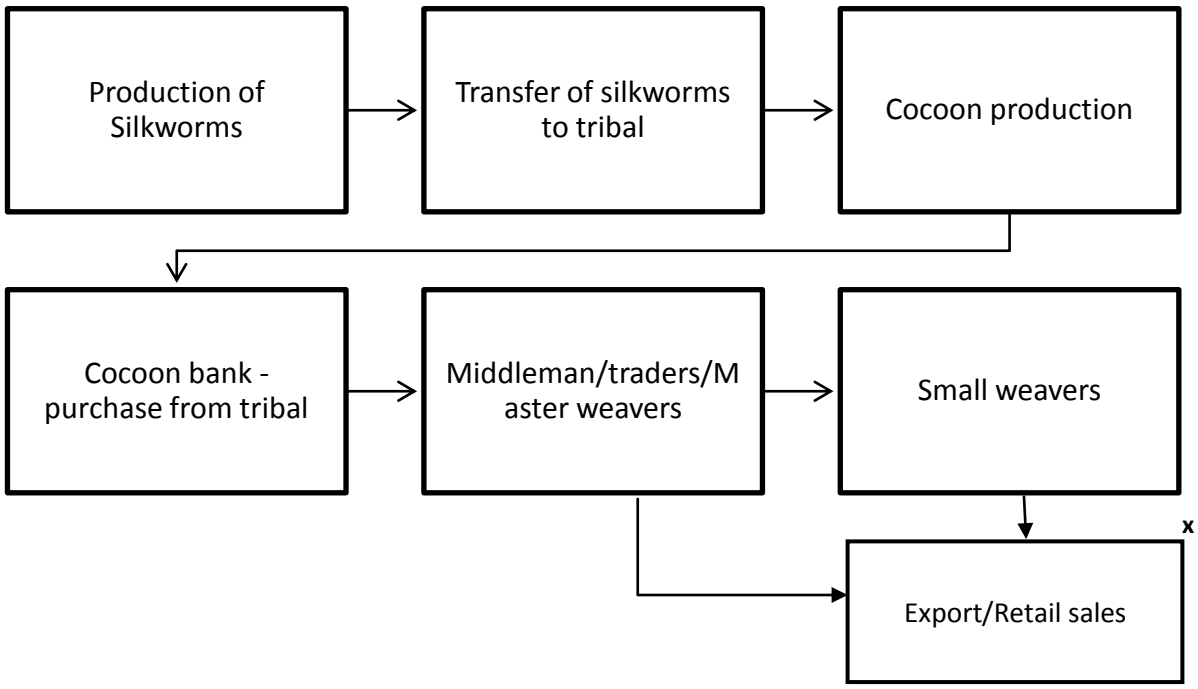
- **Government Support for Kosa**: There are very few Kosa processing units in Chhattisgarh. Traditionally Kosa farmers were exploited by traders from other state. State silk board has now set up a cocoon bank to set MSP for Kosa cocoon. All the trade now takes place through cocoon bank. Also the department provides free seeds and technical support for Kosa cultivation in select villages.
- **Synergy with existing GVT projects**: Most of the Kosa host plants are present in wasteland of farmers. GVT is setting up Wadi on the wasteland. Many times Kosa trees are cut to set up Wadi. As the Kosa plants are there in the Wadi area, In long run a Wadi farmer who is taking care of his Wadi can also cultivate Kosa on those trees.

Challenges for Kosa

During the survey it was identified key challenge for any successful intervention in Kosa is awareness and acceptability of Kosa among farmers. The data reflects only 22% people were aware of Kosa farming and out of those 22%, 75% doesn't want to try it as they find it labour intensive and less profitable. The Key challenges to promote Kosa in the project area are

- **Awareness** of Kosa cultivation among farmers
- **Poor return** as compared for the efforts:
    - The price for Kosa cocoon depends on its quality. On an average the cocoon is sold at 50 paisa per cocoon in Charama. This gives poor return to farmers.
    - Kosa farming requires constant protection of Kosa cocoons from birds and owls. Further the cultivation requires movement of Kosa insect from one tree to another during a crop cycle.

Tasar Value chain



Recommendations on Tasar promotion

GVT is advised to take the following steps immediately to formulate its long term strategy on Kosa promotion.

Recommendations	Identified partners	Work Done during the study/Current status	Suggested Interventions
Increase awareness about Kosa farming and government support schemes	State silk board	Mr A K Bajpai, Asst director silk, State silk board Ram Nagar, Kanker. Mr. Bajpai agreed for joint efforts on Kosa promotion and training.	GVT should partner with Silk board and promote and train farmers for Kosa cultivation.
Model project on Kosa cultivation in GVT Wadi	State silk board	Identified the fact that Wadis have good number of host plants for Kosa.	Identify Wadis where farmer stays close to the land and willing to cultivate Kosa at expense of GVT. As the crop cycle is short GVT can assess the profitability and take further actions
Study of development Model of other successful bodies	Pradan, Jharkhand		Visit to Pradan to understand their model, strategy and challenges

The above steps will take 6 months of efforts. Post that if Kosa is found to be profitable GVT can formulate its long term strategy for Kosa.

Mahua

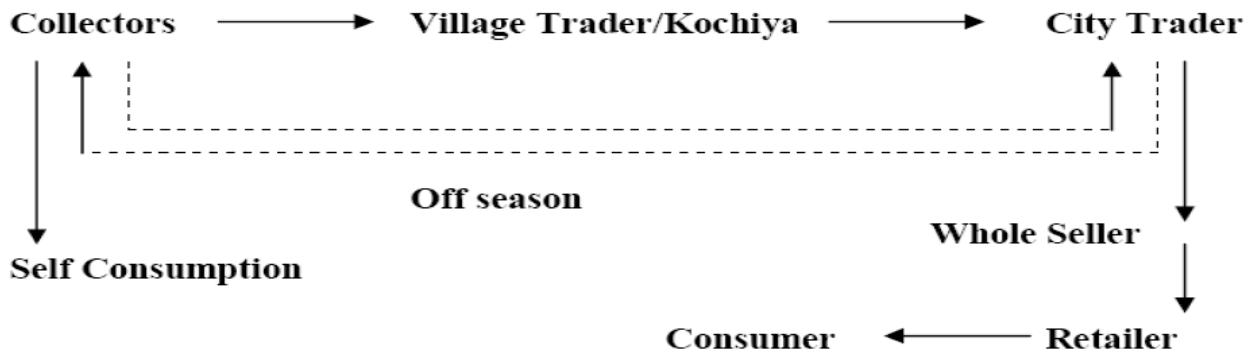
Mahua is another key NTFP collected in the project villages. It contributed to more than 50% of NTFP income.

Mahua is a large deciduous tree growing widely under dry tropical and sub tropical climatic conditions. It is an important tree for poor, greatly valued for its flowers and its seeds known as tori. The tree has religious and aesthetic value in the

tribal culture. The trees with best girth in forest are often Mahua trees as it is protected and cared by forest dwellers. Mahua tree can be found in forests, revenue, and private land. The early settlers had rights to specific Mahua trees occurring near the village in private, revenue and forestlands. Some trees may even be located at long distance from the village but are recognized as being associated to a family. These rights are only for harvesting flowers but not for fruits and have been practiced.

Mahua is collected in month of April and May and sold immediately by the tribal. Initially the prices of Mahua are high but it falls with increase in supply in the market. Mahua is bought by wholesalers and stored. In the month of January and February when farmers have cash after selling their December harvest; Mahua is bought back by the farmers at almost double the price at which they sold it. These Mahua flowers are then used to make alcohol to be consumed by the famers.

Marketing Channel for Mahua is shown below.



Recommendations for Mahua

GVT can facilitate creation of SHGs who collects and stores Mahua flowers. As the price of the flower increases in off season, the SHG can make profits from the processed and stored Mahua Flowers. A part of the profit can be used as working capital for next year and this way the SHG can be self sustainable once the initial working capital is collected by the group.

The key interventions required by the GVT would be promotion of collective work and creation of SHGs. Another Key intervention would be providing training to SHG on Mahua flowers storage and processing.

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- Mr. Shakti, **Trainer, Forest department**, Kanker, Chhattsigarh (09993225887)
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APPENDIX

Appendix 1: Primary survey instrument

Personal Profile

Name: ---------- Age: --------- Yrs Gender: M/F Village:----------

Education:------- Can Read: Y/N Can Write: Y/N

Occupation: Farmer/ Labor/ Others (----------) Cast: ---------- Member of any group/SHG: ----------

Number of Family members:---------- Adults:---------- Men:-------- women:----------

Total Land: -------- acre Cultivable Land:----------acre Wasteland: ---------- acre How far is wasteland from mainland: ----- Km

Wadi program:---------- Other uses of wasteland: ---------- Free wasteland available: ------- acre.

Total Crop production last year: **Paddy** ---------- quintal, Others:----------

Source of irrigation

	Rain	Well - Manual	Well - Pump	Tube-well	Rain water harvested	Any other (please mention)
Prime Cultivable Land						
Wasteland						

Member of GVT Wadi Program: Yes/No. Why?----------

Ques. Are you member of JFMC? Why/Why Not

Ques. Have you planted trees to collect NTFPs? Yes/ No.

Ques. If yes how many and what all trees were planted by you/your family?----------

Ques. Is everyone allowed to collect NTFPs or only members of certain cast are allowed to access NTFPs. Can Non JFMC member collect NTFPs

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Manpower - time Chart

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Agriculture – Farm preparation												
Agriculture - Harvest												
Labour - NREGA												
Months in which you don't have time from your field												

NTFP Collection

NTFP	Number of Tress owned	Number of trees cultivated	Number of Trees given on rent	Quantity collected (kg)	Rate (Rs/Kg)	Total Annual Income	Market where the NTFP is sold*	Who collects in family (M/W/C/All)	What is the value addition done (if any)
Lac	(Kusum/Palas/Ber or Kher)								
Tasar (Kosa)	(Sena/Sajha)								
Mahua									
Tori									
Harra									
Bhera									
Chironji									
Anola									
Tendupatta									

Codes* **1: Local Village market/Shopkeeper, 2: Broker who comes in village, 3: District level market, 4: Government bodies, 5: Companies/Groups processing the raw NTFP, 6: Others**

Government Schemes and Training

Tree	Attended any training	Aware of any Govt. schemes	Remarks (Reasons If aware of Govt. schemes and not opted, If Attended Training but not followed new methods)
Lac			
Kosa			

Key challenges faced in cultivating Lac & Kosa?

S.No	Challenge	Lac	Tasar	Explanation (Key points from farmer's answer)
1	Lack of **awareness** about Lac/Potential of Lac (**Never tried it**)			
2	Lack of **Training** (Crops getting destroyed due to lack of scientific methods)			
3	Lack of **Resources** (Trees, seeds, water etc)			
4	Lack of **access to market** (Poor price)			
5	Crop being **stolen**			
6	**No time** to focus on Lac/Kosa – lack of labour			
7	**Other Reasons** (weather destroying crops etc)			Lac - Kosa -

Ques. What is the source of Brood Lac & its price? Have you considered cultivating brood lac?

Ques. What is the role of women and children in Lac farming? At what all stages they are involved?

Ques. How is it decided who will cultivate Lac from trees in the Panchayat land or forest land?

Ques. Have you ever received any training on Lac cultivation? If Yes, did you try to use those methods? What were the results?

Ques. Do you sell the Stick Lac immediately or wait for the prices to improve after harvest? Immediately / Wait for market prices

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Income Exp chart

Total Income: **Rs.----------** **Agriculture Income:Rs.----------** **Labour Income:Rs.---------** **NTFP:Rs.----------** **Other Income: Rs. ----**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Loan Taken – Amount & Source												
Loan Repayment – Amount												
Months when money from Crops is sufficient to run the house												
Months in which income majorly comes from NTFPs												
Months in which Income mainly comes from Labour												
Months in which you don't have money to sustain												

Ques. Where you take your loan from and at what interest rate?

Any Other Remarks/Observation

Appendix 2: Primary survey data

The primary survey data for 116 families in 5 sample villages is attached

Project NTFP
Charama - Primary su

Appendix 3: Economic analysis of Lac processing

Assumptions

	Value	Unit	Reference
Cost of construction of Store and Processing			
1 **area**			
Store Area	800	sq ft	It needs 400 sq ft of floor area to store around 15 quintal of scraped Lac or 25 quintal of seed Lac.
Main processing Area	400	sq ft	A little innovation by creating a false hanging floor can improve the capacity without adding much to the cost
Cost of construction per Sq feet	800	Rs	
Total Cost of Construction	960,000		
2 **Cost of Machines**	112,000	Rs	Indian Lac research Institute, Ranchi
Machine Capacity	150	Kg/day	
Number of months machine operates	5		
3 **Capital Structure**			
Debt/Equity Ratio	5		
Total Initial Capex	1,072,000	Rs	
Total Grant Received	536,000	Rs	
Capex from farmers	536,000		
Interest Rate	30.00%	per annum	
4 **Salary Assumptions**			
No of Labour required	5		3 male labours for crushing, washing and grading. 2 female labours for winnowing, drying etc
Labour - Salary per month	3000	Per month	On an average a labour in village is paid Rs 80 per day of work
Supervisor Salary	5000	Per month	
5 **Other Assumptions**			
Working days in a month	30	days	
Capacity Utilization	100%		
Raw Material processed per day	150	Kg	
Cost of Raw Material	120	**Rs/Kg**	
Selling price of seed Lac (Grade A)	208	Rs/Kg	It was observed for last few years, Grade A seed lac sells at 1.73 times price of kusumi scraped lac
Selling price of seed Lac (Grade B)	187	Rs/Kg	It was observed for last few years, Grade B seed lac sells at 1.56 times price of kusumi scraped lac
Selling price of Scrap	10	Rs/Kg	
Production Yield (Grade A)	65%		
Production Yield (Grade B)	5%		
Production yield (Scrap)	4%		
Consumption of washing soda per Kg of scraped Lac	0.002	Kg	
Cost of washing soda	40	Rs/Kg	
Cost of Electricity per month	1500		
Msicelleneous cost as % of Revenue	5%		
Cloth to work for 1 month	5.00	Meters	
Cost of 1 meter of Cloths	40	Rs/meter	
Production of Grade A Lac	98	Kg/day	
Production of Grade B Lac	8	Kg/day	
Production of Scrap	6	Kg/day	

Profit and Loss Statement

Revenue (Rs.)			
	Grade A Lac	3,036,150	
	Grade B Lac	210,600	
	Scrap	9,000	
	Total Revenue	**3,255,750**	
Expences (Rs.)			
Raw Material Cost			
	Scraped Lac	2,700,000	
	Washing soda	1,800	
	Cloth	1,000	
	Total raw material cost	2,702,800	**83%**
Labour Cost			
	Supervisor	25,000	
	Working Labour	75,000	
	Total Labour Cost	100,000	**3%**
Other Exp			
	Electricity	7,500	
	Miscelleneous	162,788	
	Interest	134,000	
Total Expences		3,107,088	
Net Profit		**148,663**	**5%**

Appendix 4: Economic analysis of commercial Lac farming using Samialata plant

	Assumptions *Estimated by Forest department		
	Area	1	hectare
	Number of plants	8000	per hectare
	Manure	3	Rs/plant
	Land preparation	3	Rs/plant
	Cost of plant	3	Rs/plant
	Cost of planting and managing	2	Rs/plant
	Other Ingredients (pestcides etc)	5000	
	Miscelleneous	10000	Rs
	Cost of brood lac	120	Rs/Kg
	Selling price of scraped lac	100	Rs/Kg
	Brood lac used per plant in first year	0.02	kg
	Brood lac used per plant in second year	0.03	kg
	Scraped lac production in first crop	0.2	Kg/Plant
	Scraped Lac production from second crop	0.3	Kg/Plant
		Income Expence Sheet	
		Year 1	**Year 2**
	Income	160000	240000
	Expences first crop		
	Cost of fencing	20000	0
	Cost of plants	24000	0
	Plantation	16000	0
	Land preparation	24000	0
	Expences per crop		
	Cost of brood lac	19200	28800
	Manure	24000	24000
	Ingredients (Pesticides)	5000	5000
	Misc	10000	10000
	Total Expences	142200	67800
	Net Profit	**17800**	**172200**