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IMPACT OF SCIENTIFIC LAC CULTIVATION ON TRIBAL COMMUNITY IN KANKER DISTRICT OF CHHATTISGARH INDIA

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ABSTRACT

The lac insect, *Kerria lacca*Kerr (*Coccoidea: Homoptera*) is well known for its valuable resin. It thrives on host plants like Palas, Kusum and Ber. Lac is considered to be an important cash crop by the poor cultivators in almost all the major lac-growing states of the country. Most of the lac produced in our country is from homestead land and rural areas. A large number of poor cultivators are producing but in very little quantity. In India the lac insect is usually found in forests of Himalayan terai, hilly regions of Jharkhand, Chhattisgarh, West Bengal, Odisha, Madhya Pradesh, Uttar Pradesh, Rajasthan, Gujarat and Assam etc. Lac got its versatile uses in various sectors like paints, inks, pharmaceuticals, cosmetics, electrical industry, automobiles, defense, railways, marine and postal department, surface coating industry, confectionery industry, fruit and vegetable coating, soft drinks, chocolate and candy coating, and lac dye for textile industry etc.The objective of present study is to study the lac cultivation and production in Kanker district of Chhattisgarh. The approach used in the present methodology was based on primary data and information. The study was conducted during the year 2021.A questionnaire was framed for collection of data and information during the field surveys. Data and information for estimation of lac production and processing was collected from the month of March to July of year from study area.Keeping this idea in view, this study was conducted to analyze the economic benefits of the farmers and to trace out the market chain, from the outset of harvesting season of lac by the farmer to the big industries where the final lac-based product is prepared. The lac growing farmers were being interviewed on a random basis and the data was collected. Apart from the economic analysis of the market chain of lac, the study is aimed to find the linkage between the adoption of lac cultivation and that of ecological parameters affected either positively or adversely. Keeping in view the importance of lac cultivation, there is a need for properly identifying, documenting and conserving the lac insects and associated fauna.

Key words: Lac cultivation, Economic analysis, Ecological parameters

Introduction

Lac, a crimson red animal resin secreted by female lac insects, has been used by people in India since ancient times. Lac insects, belonging to the family Kerriidae and scientifically known as *Kerria lacca*, are small in size and unfortunately lose their lives during the lac production process. However, lac itself is a biodegradable and non-toxic substance. Cultivation of lac has been practiced in countries like India, Bangladesh, Myanmar, and Thailand. The most common host trees for commercial lac cultivation are *Butea monosperma* (Palas), *Ziziphus mauritiana*(ber) and *Schleicher aoleosa* (kusum), besides several other trees of regional importance (Roonwal *et al.*, 1958; Roonwal and Singh, 1958; Varshney and Teotia, 1967 and Sharma *et al.*, 1997). The life cycle of lac insects is complex, involving various stages from egg production to adult reproduction, each stage intricately connected to the environment and suitable host plants. The Indian lac insect has two strains commonly called *kusmi* and *rangeeni*. Both the strains produce two crop in each year. The two lac crops of *rangeeni* insects are summer season (*baisakhi*) and rainy season (*katki*). Similarly, lac crops of *kusmi*insect are summer (*jethwi*) and winter (*aghani*).

Lac cultivation is an important source of income and has high potential for generating employment for both men and women in forest and sub-forest areas of Chhattisgarh and other state of the India. It is a very remunerative crop, paying high economic returns to the farmer's especially tribal area as well as forests of the country. The scientific study of lac began in 1709 when Father Tachard started his investigations. After several changes, the name "*Laccifer lacca"* was ultimately chosen for this substance. The scientific understanding of lac insects' dates back to 1782 when J. Kerr provided the first account of these insects in the Philosophical Transactions of the Royal Society of London. Initially named *Tachardia lacca,* it later became known as *Laccifer lacca Kerria lacca.* Lac insects belong to the class Insects, order *Hemiptera,* suborder *Homoptera,* superfamily *Coccoidea,* family *Lacciferidae,* genus *Laccifer,* and species *lacca*. India is the largest producer of lac, accounting for 50-60% of the world's total production, with the highest production in states like Jharkhand (57%), Chhattisgarh (23%), West Bengal (12%), Madhya Pradesh, Bihar, and others.

On the basis of preference in use for lac cultivation by Indian cultivators, centuries of practical experience and distribution in the country, the lac hosts are placed under three categories, viz. (i) common or major hosts, (ii) occasional hosts, and (iii) rare hosts. Although more than 250 host plant species of *K. lacca*have been identified so far, the first category, i.e., common or major hosts include fourteen species in which three, namely Palas (*Butea monosperma*), Kusum (*Schleichera oleosa*) and Ber (*Zizyphus mauritiana*) are of all India importance contribute 95% of commercial production of lac (Kumar, 2002).

Chhattisgarh is a one of the highly forested (41%) along with the tribal dominated state of India with the total geographical area of 13,787 thousand hectares. The state divided in to three agroclimatic zones *i e.*, North Hill of Sarguja, Chhattisgarh Plain and Southern Bastar Plateau. The present study area comes under the north portion (known as Uttar Bastar Kanker) of Southern Bastar Plateau of Chhattisgarh. The majority of Kanker district population mainly depends on agriculture and forest for their livelihood and lac is one of the important source of cash income for their families. Because study area having suitable agro-climatic condition, availability of host tree in forest and also their agriculture fields, traditional resources, knowledge and efficiency for lac cultivation and production. Traditionally, lac collection was carried out in historical time by tribal communities living in forests. However, with the advancement of scientific lac cultivation techniques, these communities have embraced cultivation practices, leading to significant improvements in their livelihoods, socio-economic conditions, and cultural aspects. As per research lac cultivation now provides three times more income than traditional agricultural crops.

This study aims to explore the implications of scientific lac cultivation on the socio-economic conditions, livelihoods, and cultural aspects of tribal communities. By examining the changes witnessed before and after the adoption of scientific lac cultivation, this research seeks to shed light on how tribal communities have improved their economic conditions through this alternative livelihood in the study area.

Materials and Methods

The present research was conducted at Kanker district of Chhattisgarh in year 2021. The district is situated between the latitudes 20.6-20.24 and latitudes 80.48-81.48, covering an area of 5285.01 square kilometers. Kanker is positioned between the state capital, Raipur, and Jagdalpur, the district headquarters of Bastar district of the southern Bastar plate agroclimatic zone of state.

Sureli village, located within Kanker Tehsil of Uttar BastarKanker district, was chosen as the study area due to its geographical location and the presence of natural lac host plants. The village is situated 28 kilometers away from Kanker, which serves as both the district and sub-

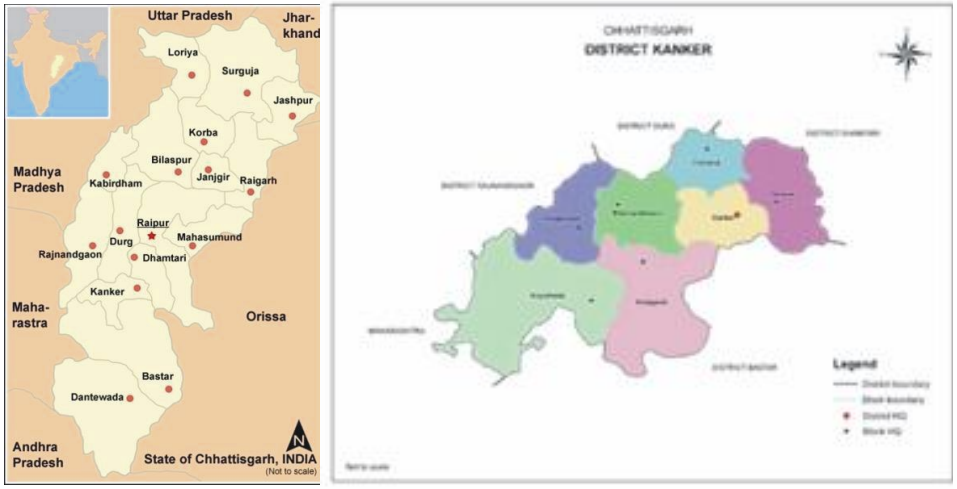

Fig 1: Map of the study area

district headquarters. The total land area of the village measures 394.5 ha and it has a population of 590 individuals according to the 2011 Census of India Report. The village consists of approximately 136 households.

Kanker district is renowned for its lac production, contributing significantly to the state of Chhattisgarh. On average, the district produces 632.5 tons of lac, accounting for 18.12% of the lac production in the state. The presence of a processing unit near Korar (Kanker), approximately 9 kilometers away from Sureli village, provides opportunities for local tribal to engage in lac cultivation.

For the purpose of the study, respondents were randomly selected from Sureli village using a prepared questionnaire. The targeted population was sampled through a simple random sampling process. Primary data was collected from the lac farmer's community using the questionnaire. The data encompassed information on lac host species, distribution, lac production and income, soil productivity testing, local flora and fauna, among other relevant factors.

Results and Discussion

A random sample of approximately 50 respondents was selected to gather information about lac-based farming practices. These respondents were asked various questions pertaining to their involvement in lac cultivation, and the responses were recorded and tabulated in three separate tables Table No. 1, Table No. 2 and Table 3. These tables were categorized based on the different host species on which lac is harvested.

The village of Sureli was selected for present research work due to its suitability for studying lac cultivation, presence of several host trees such as Kusum (*Schleichera oleosa*), Ber (*Ziziphus mauritiana*), and Palas (*Butea monosperma*), in the forest as well as on farmers field and also community or panchayat land which are commercially exploited in different part of Kanker district. The comprehensive economic study is divided into four distinct stages, representing the market value chain that encompasses the entire process from the initial lac harvesting by local farmers in the village to the export of lac-based products by large industries. The data collected and analyzed in this study provide valuable insights from an economic standpoint, shedding light on the significant impact of lac cultivation on the local economy.

Stage First: Cultivation of lac and marketing by farmers

In the Sureli village, there is a total population of 590 residents, out of which approximately 250 individuals are engaged in lac cultivation as scientific lac growers. Results showed, around 50% of the farmers in the village show high levels of enthusiasm and active participation in acquiring new knowledge and skills related to lac cultivation. This eagerness to learn stems from their active involvement in various training programs organized by the forest department, agriculture department and also by Krishi Vigyan Kendra etc. The positive outcomes of these training initiatives have had a ripple effect, benefiting a significant number of individuals in the community. Furthermore, these efforts have led to the establishment of approximately 10 Self-Help Groups (SHGs) locally, operating under the umbrella of Van Dhan Vikas Kendra (VDVK). The primary objective of these SHGs is to strengthen and support lac cultivation practices within

Table 1: Kusumi lac Production and income on host tree *Schleichera oleosa.*

S. N.	Name of Farmer	Number of host trees	Production during June- July, 2021 (Kg)	Income generated (in Rs)	Haat/ Bazaar where Lacispurchased by Businessman/ Forest Department
1.	SukhramKawde	25	100	34,600	Korar
2.	Dharmendra Sen	25	150	51,000	Korar
3.	Kirtan Jain	3	25	8,500	Kanker
4.	Rajendra Kawde	5	100	34,000	Kanker
5.	Raju Kawde	20	130	44,200	Korar
6.	JagdevKawde	25	250	85,000	Korar
7.	Ramesh Kawde	5	47	15,980	Korar
8.	MeturamUsendi	7	60	20,400	Korar
9.	Shiv Usendi	20	150	51,000	Kanker
10.	AnkalTeta	25	200	68,000	Korar
11.	Mansa Ram Kawasi	10	100	24,000	Kanker
12.	Ashish Jain	25	260	88,400	Korar
13.	Ram Singh Jain	10	96	32,640	Korar
14.	Johan Dugga	20	220	74,800	Korar
15.	DevnathDugga	30	250	85,000	Korar
16.	Gokul Jain	3	35	11,900	Korar
17.	Lalit Darro	5	50	17,000	Kapsi
18.	Balram Usendi	10	98	33,320	Kanker
19.	AnkaluramUsendi	15	150	51,000	Korar
20.	Bhagwat Jain	5	20	6,800	Kanker
Mean		**14.65**	**124.55**	**41877**	
SD		**9.25**	**77.64**	**26647.75**	
SEm±		**2.07**	**17.36**	**5958.62**	

Table 2: Kusumi lac Production and income on host tree *Ziziphus mauritiana*.

S. N.	Name of Farmer	Number of host trees	Production during June- July, 2021 (Kg)	Income generated (in Rs)	Haat/ Bazaar where Lacispurchased by Businessman/ Forest Department
1.	Bhagwat Jain	3	25	7,500	Korar
2.	SanoshBaghel	5	48	14,400	Kanker
3.	Devlal Nishad	4	30	9,000	Korar
4.	Johar Darro	3	20	6,000	Korar
5.	Lakhan Sahu	2	10	3,000	Korar
6.	Ramesh Kawde	4	45	13,500	Kanker
7.	Mansa Ram Kawasi	5	50	15,000	Kanker
8.	Shiv Usendi	2	15	4,500	Korar
9.	Johan Dugga	6	60	18,000	Kanker
10.	Binod Singh	3	22	6,600	Korar
11.	Okul Jain	2	14	4,200	Korar
12.	Lalit Darro	3	28	8,400	Kanker
13.	Jay Singh Darro	4	50	15,000	Korar
14.	Ballu Ram Kawde	3	22	6,600	Korar
15.	SukhramKawde	2	15	4,500	Kanker
16.	Bhav Singh Jain	3	25	7,500	Kanker
Mean		**3.375**	**29.9375**	**8981.25**	
SD		**1.20**	**15.57**	**4671.36**	
SEm±		**0.30**	**3.89**	**1167.84**	

the community. To gather relevant data for academic research, a random sampling method was employed, resulting in the selection of 50 farmers. The collected data has been carefully recorded and tabulated, forming a valuable resource for further analysis and investigation.

The analysis of Table No.1, 2, and 3 provides valuable insights into lac production on different host trees, namely Kusum (*Schleichera oleosa*), Ber (*Ziziphus mauritiana*), and Palas (*Butea monosperma*).

Across all three tables, it is evident that lac production varies among farmers, indicating the influence of multiple factors such as farming techniques, tree management, and environmental conditions. The table showed the quantity of lac produced during the specified period in Sureli village ranged from 10-500 kg, reflecting diverse levels of engagement and productivity in the lac industry.The income generated from lac production also exhibited considerable variation, with earnings was ranged from Rs 2,420- 88,400/-. This difference can be attributed to variations in production quantity, quality, market prices, and local demand. Additionally, the observation highlights the existence of different haat bazaars, including Kapsi, Korar, and Kanker, where lac is purchased by local level businessmen or the State Forest Department, indicating the presence of local lac markets and trade networks.

Overall, these findings emphasize the significance of factors such as host tree selection, farmer practices, market dynamics, and geographical location in lac production. Further research can delve into understanding the specific factors influencing lac productivity on different host trees and explore strategies for enhancing production efficiency, profitability, and sustainability in the lac industry.

Stage Second: Procurement of Lac by Small Traders at Haat Bazaar

In the market chain of lac, small traders play a crucial role as intermediaries between farmers and large traders. They purchase lac directly from growers and engage in primary processing before selling it to the large traders. The following key points can be concluded from the study:

In Korar Range Mr. Rahipal Sinha from Kokanpur is the main buyer, procuring 65% of the lac, followed by Mr. Parmeshwar Pandey (20%).Small traders in Korar range primarily process the lac to produce Seed lac, which involves crushing, sieving, and washing to remove impurities.Mr. AmarchandLukkad from Korar further processes Seed lac into button lac and sell it to Mr. Yosuf Khan, a big trader in the Korar.Results also revealed that the average profit earned by small traders acting as intermediaries is Rs 20/-kg for Kusumi lac and Rs 10/-kg for Rangeeni lac.During the study we reported an average a trader earning was Rs 33,000/- noted for Kusumi lac whereas, Rs 5,500/- noted for Rangeeni lac.

In case of Kanker Range Mr. Asun from Kanker is the largest buyer, procuring 450 Qntl. of lac, followed by 350 Qntl. of lac procured by Mr. Nabbu.Majority of small traders in Kanker act as intermediaries, selling lac at a higher cost without further processing. During the study we noted some of the traders in Kanker also engage in primary processing, similar to Korar, to produce Seed lac.The average profit earned by small traders acting as intermediaries was recorded Rs 25.71/kg for Kusumi lac and Rs 21.42/kg for Rangeeni lac. The average, a trader earning was 2,56,179/- noted from Kusumi lac whereas Rs 95,254/- noted for Rangeeni lac. The present study also provides information of seedlac industries. In the Korar range Jaiswal Shellac Industries is primarily

Table 3: Rangeeni lac Production and income on host tree *Butea monosperma*

S. N.	Name of Farmer	Number of host trees	Production during June- July, 2021 (Kg)	Income generated (in Rs)	Haat/ Bazaar where Lacispurchased by Businessman/ Forest Department
1.	Pilluram Jain	25	100	11,000	Kapsi
2.	Sukuram Jain	20	100	11,000	Korar
3.	Pradeep Kumar	100	500	55,000	Korar
4.	Rameshwar Baghel	20	96	10,560	Korar
5.	Amrita Jain	25	98	10,780	Korar
6.	Shri Jain	10	48	5,280	Kanker
7.	Ram Jain	10	49	5,390	Kapsi
8.	Dev Prasad Jain	20	94	10,340	Korar
9.	Santosh Baghel	20	95	10,450	Kanker
10.	Ballu Ram Kawde	10	55	6,050	Korar
11.	Mannu Salam	5	25	2,750	Korar
12.	Gulab Kawde	25	120	13,200	Korar
13.	Jay Singh Darro	12	60	6,600	Kanker
14.	JoharDarro	20	100	11,000	Korar
15.	KanesinghDarro	8	40	4,400	Kanker
16.	Devlal Nishad	22	90	9,900	Korar
17.	Shivlal Nishad	13	66	7,260	Kanker
18.	Pramod Singh	28	120	13,200	Korar
19.	Lakhan Sahu	32	150	16,500	Korar
20.	Urmila Baghel	8	38	4,180	Korar
21.	Binod Singh	19	97	10,670	Korar
22.	RupeshwarBaghel	14	70	7,700	Korar
23.	Rattu Jain	7	22	2,420	Kanker
Mean		**20.57**	**97.09**	**10679.57**	
SD		**18.84**	**93.77**	**10314.49**	
SEm±		**3.93**	**19.55**	**2150.72**	

purchases Seedlac, it is largest buyer, and procuring about 85% of the lac in Range Korar. Whereas, in Kanker range Mr. Sahjad is identified as a significant buyer, procuring about 75% of the lac from Range-Kanker.These key points highlight the role of small traders, the primary processing involved, the average profits earned, and the major buyers in the lac market chain.

Stage Third: Procurement of Lac by Large Traders at Haat Bazaar

In the lac market chain, large traders play a crucial role as they have direct connections with lac-based industries and handle significant procurement demands. The following key points can be concluded from the study:

In Korar Range there are four main traders was reported, but Mr. Anup Singh Rathore and Mr. Adesh Singh Chauhan are being the chief buyers, procuring 82% of the lac.The net profit margin for Kusumi lac was reported Rs 26.25/ kg, whereas, for Rangeeni lac, it was Rs 45/ kg.The average profits for Kusumi and Rangeeni lac were recorded Rs 5,38,125/- and Rs 2,84,625/- respectively in study area.The primary purpose of the large traders in this range was to process lac and produce Seedlac for industrial use. The present study also reported Jaiswal Shellac Industries and Bastar Lac Industries were the principal buying industries.

In Kanker Range there are seven main traders was reported, but Mr. Dilawar, Emraan Enterprises, and Taj Agency Kanker are being the major purchasers, procuring 90% of the lac.The net profit margin for Kusumi lac was reported Rs 22.14/ kg, whereas for Rangeeni lac, it was Rs 27.14/kg.The average profits for Kusumi and Rangeeni lac were Rs 5,61,403 and Rs 4,75,329 respectively in the study area.The primary purpose of the large traders in this range was to process lac and produce Seedlac, Button lac, and Chapda (polished lac stone) for industrial use.To produce button lac, the process involves packing Seedlac into a long, narrow, round cloth bag and heating one end over an oven containing a charcoal fire while the other end is gradually twisted. The present study also reportedJaiswal Shellac Industries, Bastar Lac Industries, and Mausin Traders were the principal buying industries.These key points highlight the role of large traders, their procurement demands, net profit margins, and the purpose of usage of lac in the lac-based industries.

Stage Final: **Procurement by Lac-Based Industries**

In the final phase of the lac market chain, the processed lac products, including Seedlac, Button lac, and Chapda, are utilized by lac-based industries. These industries cater to the high demand for lac-based products in various sectors such as bangle-making, cosmetics, pharmaceuticals, and perfumes. However, due to infrastructural limitations, there were currently two lac-based industries operating in the Kanker Range, namely Habib Shellac Industries and Noori Shellac Industries. Both Habib Shellac Industries and Noori Shellac Industries have been operational for a significant period and have an annual turnover of 1 Cr.They are situated

approximately 25 km from the village of Sureli.The presence of these industries near the village serves as an inspiration for local farmers to engage in lac cultivation due to the economic viability it offers.The establishment of lac-based industries not only contributes to increased profits but also creates numerous employment opportunities, thereby boosting the local economy.Collectively, these industries employ a total of 150 laborers.To meet their production requirements, these industries procure substantial quantities of processed Seedlac, Button lac, or Chapda from the weekly market in Kanker.The lac-based products produced by these industries are ultimately exported to other states.These important points emphasize the significance of lac-based industries in the region, their economic benefits, employment generation, and the impact they have on motivating local farmers to engage in lac cultivation.

Banerjee (2022) examined lac cultivation as a sustainable agricultural practice, emphasizing its role in reducing deforestation and land degradation. The research suggested that integrating scientific lac cultivation techniques with traditional practices could improve both ecological sustainability and rural livelihoods. Mishra and Pandey (2021) also focused on innovations in lac processing, highlighting value addition techniques that increase marketability. Their study analyzed the transition from raw lac to processed products such as seedlac and shellac, which fetch higher market prices and expand the industry's commercial potential. Singh and Verma (2020) assessed the economic feasibility of lac farming in Jharkhand, finding that farmers engaged in systematic lac cultivation earned three times more than those relying solely on traditional agriculture. The study emphasized the need for government support in providing subsidies, technical training, and access to markets to enhance lac cultivation's profitability. Ghosh and Pal (2019) explored the ecological benefits of lac cultivation, identifying its role in biodiversity conservation. The study demonstrated that lac cultivation supports agroforestry practices, enhances soil fertility, and contributes to carbon sequestration. Furthermore, it highlighted the symbiotic relationship between lac insects and host trees, which strengthens forest ecosystems. Tiwari (2018) explored lac cultivation as an alternative livelihood strategy, emphasizing its potential in reducing economic vulnerability among tribal farmers. The research documented the shift from traditional subsistence farming to lac cultivation, leading to increased household incomes and reduced dependence on seasonal employment. Mehta and Kumar (2016) conducted a market analysis of lac production in India, noting that price volatility and export regulations have impacted the industry's stability. Their research recommended policy interventions to stabilize market prices and encourage small-scale farmers to expand lac cultivation. Roy and Sharma (2010) examined the contribution of lac cultivation to the rural economy, highlighting its role as a major livelihood source for forest-dependent tribal populations. Their study found that lac farming contributes significantly to income generation, particularly in the states of Jharkhand, Chhattisgarh, and Madhya Pradesh. Sharma and Ramani (2008) reviewed technological advancements in lac culture, including improved host plant selection, pest control methods, and enhanced production techniques. Their research emphasized the role of scientific interventions in boosting lac yield and reducing crop losses due to predators and environmental factors..

Summary and Conclusion

Lac cultivation in central and eastern India offers high economic returns to farmers compared to other crops. It is like an insurance crop especially during drought year as the agriculture crops is very poor during such adverse climate. A good number of lac host trees like Kusun, Palash, Ber etc. naturally occurring in forest and sub forests in study area are available for commercial exploitation. It involves various challenges such as funding, marketing, and ecological issues. To overcome these constraints, measures such as training farmers, promoting cooperatives, and conserving lac insects and host plants are essential. Lac cultivation contributes to rural income, generates employment, and can be integrated with agriculture for increased productivity. Conservation efforts are crucial to protect lac insect biodiversity and associated fauna. Strengthening market-oriented strategies and adopting sustainable practices are key for sustaining the economic benefits of lac cultivation.

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