



Advances in Lac Production, Processing, Product Development and Value Addition

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Left to Right : Row 1- Lac based handicraft items; Row 2 - Lac cultivation on ber, Lac processing plant, bleached lac, Lac coated *kinnow*; Row 3 - Lac encrustation

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Socio-Economic Silhouette and Value Chain Analysis: An Overview of Lac Sector

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Introduction

Indian subcontinent is the major hub of biodiversity of fauna and flora. Several forest produces have significant importance in social and economic life of tropical lands. These forest produces are classified into wood and non –wood forest produces (NWFP). NWFP includes natural resins, gums and exudates, leaves (tendu), turpentine from pines, and perfumery oils from roots, stumps and fruits of various tree species. Most NWFPs are export currency earners and many are well suited for local small scale industries. NRGs of commercial importance like lac, rosin, *guar* gum (*Cyamopsis tetragonolobus* L.), *karaya* gum (*Sterculia urens*), *dhawada* gum (*Anogeissus latifolia*), *salai* gum (*Boswellia serrata*), *char /piyar* gum (*Buchanania lanzan Spreng.*) and *babool* gum (*Acacia nilotica*) are produced in India. Resins are valued for their chemical properties and associated uses, such as the production of varnishes, adhesives and food glazing agents. This group of natural resins includes lac secreted by an insect and plant originated products like rosin, copal and dammer.

Lac is a natural resin secreted by an insect *Kerria lacca* (Kerr), which thrives on the tender twigs of specific host trees viz., *palas* (*Butea monosperma*), *ber* (*Ziziphus mauritiana*), *kusum* (*Schleichera oleosa*), *Flemingia semialata*, *Ficus* spp. etc. *Rangeeni* and *kusmi* are the two strains of lac insect which are classified, based on preference of the insect for specific host trees. Lac cultivation is an important source of income

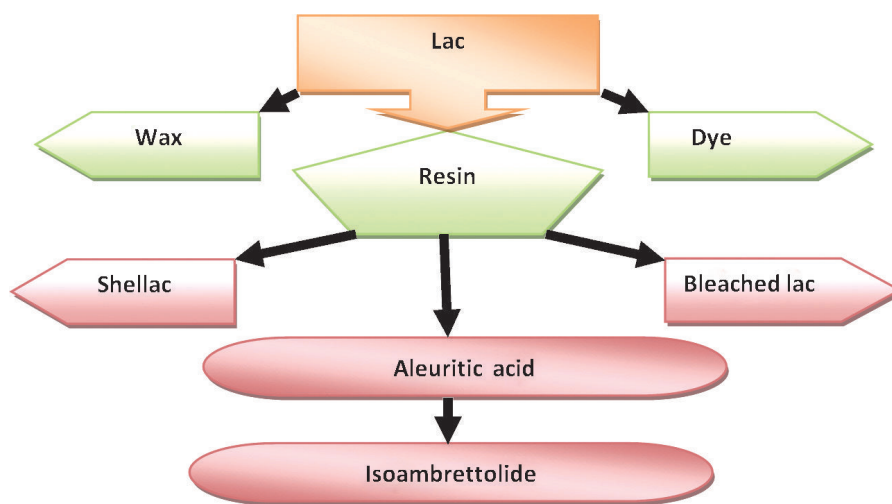


Fig.1: Components of lac and its value added products

for livelihood of the forest and sub-forest dwellers in different states. Besides, it has high potential for generating employment for both men and women in forest

and sub-forest areas of Jharkhand, Chhattisgarh, Madhya Pradesh, West Bengal, Maharashtra, Odisha and parts of Uttar Pradesh, Andhra Pradesh, Gujarat and NEH region. It is a highly remunerative crop, paying high economic returns to the farmers and also foreign exchange to the country through its export. India is traditionally the largest producer of lac; *guar*, *psyllium* and *karaya* gums. The raw lac is the source of three valuable, natural and renewable products *i.e.* resin, dye and wax (Fig.1). Further, processing results in variety of lac based products and by products. Resins are largely used in surface coating formulations and very good source of several bio-active compounds of various uses.

Socio-economic relevance

The importance of lac can be visualized at regional, national and global levels. Lac is principally cultivated by tribals inhabiting forest and sub-forest regions of the country. It forms an important source of income to the majority of lac growers. The lac produced can also be a local opportunity for setting up of small cottage industries for employment and revenue generation. Lac production is viable tool for livelihood enhancement, especially in the lac growing belt of India. As lac hosts can be raised on lands unsuitable for agriculture, lac culture can be integrated with wasteland development and afforestation programmes. In the global context, lac can be seen as a natural, renewable, nontoxic and eco-friendly source of material with a wide range of applications. It has the tremendous scope of application in food industry as scuff resistance, anti-sticking and moisture barrier; in pharmaceutical industry as coating material and slow release applications; in polish/paint/ varnish /lacquer as a moisture barrier and granulating agent. It is also used in preservation work of art, archeological and zoological specimens. To dye wool and silk, lac dye is used in silk and wool industry. It also have various applications in cosmetic (lipsticks, perfumes), jewellery industry, adhesive industry, electrical industry (electronics), defence (gunpowder), *etc.*

The analysis of survey data made in Jharkhand shows that on an average 37.5% lac growers possessed marginal land holding (0.73 ha), 48.0% had small land holding (1.51 ha) and 14.5% possessed large land holding (2.82 ha). Average family size was observed about 5.3 members. Irrigated land was very less and it was only 6.1% of the total operational land holding. Average literacy rate of lac grower's was 64.0%. Majority of the family heads have education level up to high school. Income from lac cultivation was found to contribute towards 18.5 and 26.4% of total income and farm income, respectively. Lac is a subsidiary crop for the lac growers who depend on it for meeting cash expenses towards the household requirements. Utilization of host trees for lac cultivation in the study area were 28.7, 53.8, 17.2 and 7.4 % for *palas*, *ber*, *kusum* and other host trees, respectively. This indicated a greater scope for increasing lac production by utilizing more lac hosts trees. Major causes for low utilization of hosts were found to be shortage of funds for purchase of broodlac, uncertainty in production, poor market support, scattered lac host trees, *etc.* Input requirement and financial aspects for bankable projects are given in Table 1 and Table 2.

Service providers for input market and financial aspects

Specifications about required inputs, their availability and key features are illustrated in Table 1 and financial aspects about lac based bankable projects are presented in Table 2.

Table 1. Input requirement, availability and key features

Sl.	Particulars	Requirement	Availability	Key features
1.	Broodlac	1.0m long broodlac stick per 10-15m long inoculable shoots.	Broodlac farms.	Timely supply of viable and quality broodlac is the key for higher profit.
2.	Pesticides	Recommended dose by ICAR-Indian Institute of Natural Resins and Gums, Ranchi.	Service providers/outlets.	Lack of technical know-how is the major hurdle in procurement and use of the inputs.
3.	Labour	Unskilled and semi-skilled labour and may vary crop to crop.	Family labour.	Highly perishable input. Hired labour is rarely used in lac cultivation activities.
4.	Tools and equipments	For pruning, inoculation, pest control and harvesting purpose.	Outlets of various private sector companies.	Multiple uses and need to buy once in 5-10 years depending on expected life.
5.	Technical guidance	Training and quality literature in local language.	ICAR-Indian Institute of Natural Resins and Gums, Ranchi.	Linkages with the NARS, TRIFED, line departments, grass root level NGOs, etc. is the key for effective coverage.

Table 2. Financial aspects for bankable projects

Sl.	Particulars	Key features
1.	Price	<ul style="list-style-type: none"> ▪ Farm gate price of sticklac and broodlac. ▪ Quality based price variation. ▪ Price fluctuation over time.
2.	Margin money	<ul style="list-style-type: none"> ▪ About 5, 10 and 15% margin money is prescribed for small, medium and large farmers, respectively.
3.	Bank loan	<ul style="list-style-type: none"> ▪ About 85 - 95 % of the total cost of project
4.	Rate of interest	<ul style="list-style-type: none"> ▪ As per RBI guidelines.
5.	Security	<ul style="list-style-type: none"> ▪ As per RBI guidelines.
6.	Cash flow pattern	<ul style="list-style-type: none"> ▪ Gestation period is about 6-8 months for <i>ber</i>, <i>kusum</i> and <i>palas</i>. ▪ About two years of gestation period in case of <i>F. semialata</i>.
7.	Financial analysis	<ul style="list-style-type: none"> ▪ <i>F. semialata</i> plantation in a hectare of area and 100 lac host trees each of <i>ber</i>, <i>palas</i> and <i>kusum</i> can be taken into consideration.
8.	Repayment schedule	<ul style="list-style-type: none"> ▪ Benefit Cost (BC) ratio in lac cultivation of various lac host trees/plants ranges from 1.8 to 3.85.

About 200-250 millions of lac host trees available across the country and only 40-50 % lac host trees (available for lac cultivation) are utilised. Lac cultivation is a labour intensive activity and supports about one million farm families. Basic operations for lac cultivation are selection and preparation of lac host trees; inoculation; *phunki* removal; pest management; harvesting and scraping.

Lac marketing

Mature or immature (*ari*) crop along with branches are cut down and the lac encrustation is scraped by the cultivators. Sticklac in small quantity (< 10 kg. lot) is generally sold in the *haats* by the lac growers. The rural markets (*haat*) in remote areas / lac growing areas operate once or twice in a week. Farmers in these markets sell lac and other farm produce and purchase their daily requirement goods. Lac growers, after harvesting sticklac sell it in the village itself or bring it to the nearest village market for sale to *paikars* (primary purchasers). Lac growers, nearer to lac processing units, also sell their produce directly to processing units. Prices of lac in the market depend upon the *Chouri* (seedlac) price in processing units. The *paikars* sell it to the wholesaler in the same market or nearby manufacturing centers in bigger lots and the wholesalers sell to manufacturers at different lac processing centers. After processing, lac is sold for internal consumption within the country or exported by lac exporters. Marketing system of the sticklac starting from the lac growers to the domestic consumption or export is presented in Fig. 2

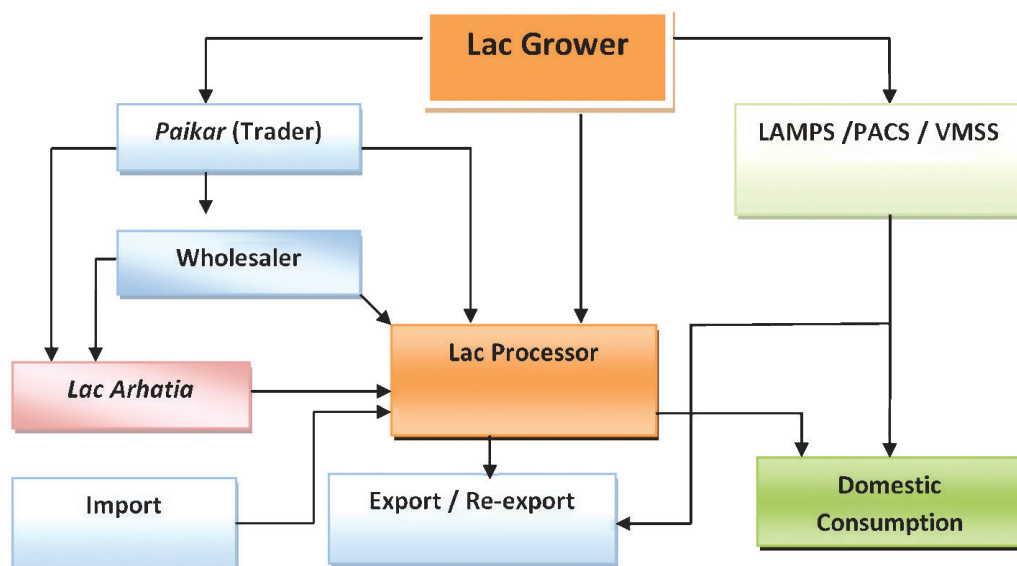


Fig. 2. Lac marketing channels

Price spread in lac marketing is affected by the market margin and marketing costs incurred by primary purchaser on transportation, handling loss and other. During peak arrival period the primary purchaser sell the produce to the wholesaler within

one or two days while in lean period they sell it on weekly basis. The wholesaler pays the major portion of the marketing cost of lac. Generally storage of lac at wholesale point takes place for a period of one to three months. Price range of lac, its value added products and by-products depicted in Table 3.

Table 3. Average min-max price during last two years of sticklac, its value added products and by-products.

Sl.	Particulars	Price (₹/kg)	
		Minimum	Maximum
1.	Sticklac	100	800
Value added products			
2.	Seedlac	200	1000
3.	Shellac	400	1200
4.	Bleached lac (export quality)	400	1300
5.	Aleuritic acid	2000	7000
By Products			
6.	Lac dye	2,000	3,000
7.	Lac wax	500	1300
8.	Mollamma	60	80
9.	Ghonghi	30	60
10.	Kiri	80	115

Transportation cost incurred by wholesaler varies according to the location of the different lac processing centers in the country where it has to be disposed for processing and amount of quantity handled. Sticklac and seedlac price movements over the previous years are depicted in Fig. 3

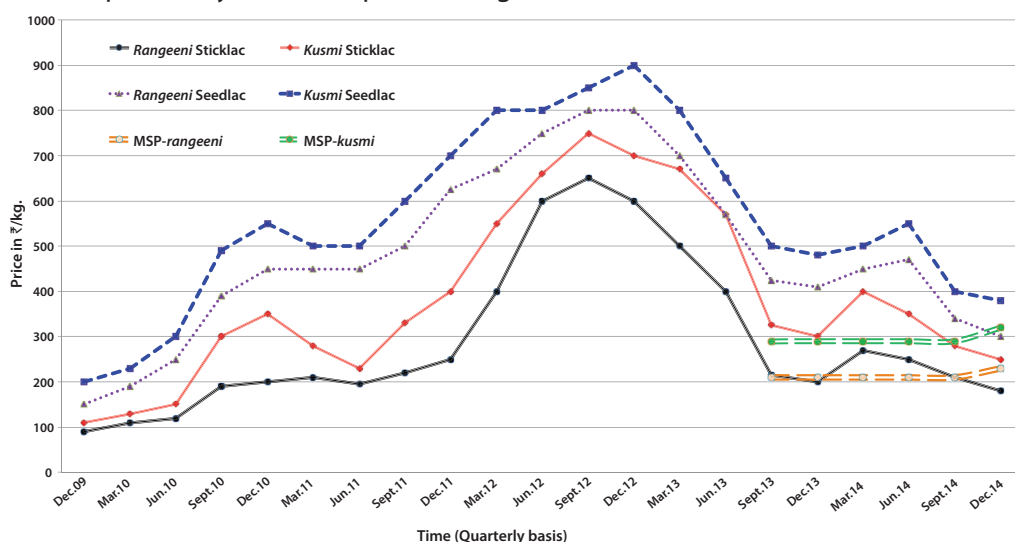


Fig. 3. Sticklac and seedlac prices movements during previous years

Thus, it is evident that the wholesaler is a vital player in marketing of lac. Major portion of the arrivals in the market is marketed through *Arhat* and where it is sold by open auction method.

Lac processing and export scenario

Lac processing units fall into two groups, namely manual and mechanized units. Manual units scattered all over the state of West Bengal, Jharkhand, Madhya Pradesh and Chhattisgarh. Manufacturing of lac bangles is a traditional industry where large quantities of resins are still being used. These units are situated at various locations like Bihar (Muzaffarpur), Rajasthan (Jaipur), Uttar Pradesh (Varanasi), Andhra Pradesh (Hyderabad), West Bengal (Balarampur), etc. There are about 150 processing centre for making lac based products like seedlac, shellac, bleached lac, dewaxed shellac, lac dye, button lac, aleuritic acid, gasket shellac compound, lac wax, dewaxed decolourised lac, etc. Locations of lac processing units, export agencies and marketing hubs for domestic consumption are depicted in the Fig. 4.

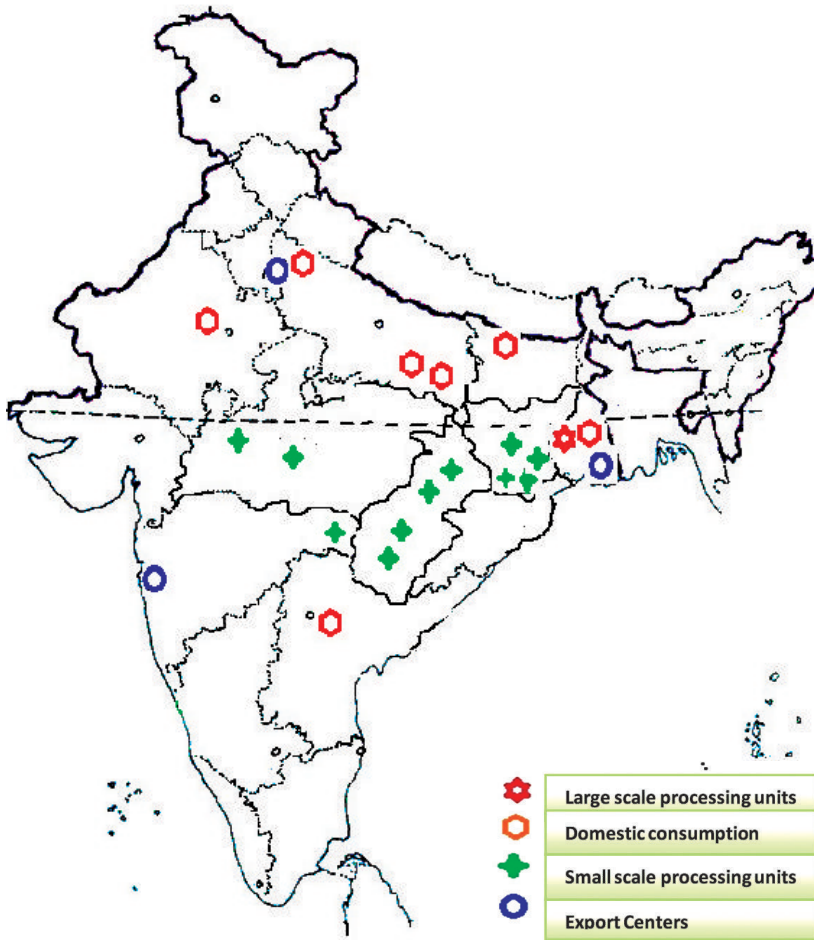


Fig. 4. Major locations for different lac based activities in the country

Share of lac export in India's total export is very less, but it is more important in terms of livelihood security, environmental stability and sustainable development. Earnings of foreign exchange through export of lac based products has been increased from ₹ 1,100 million in 2009-10 to ₹ 5685 million during 2013-14. Lac is exported to more than 60 countries of the world. Trends in export (quantity and value) of lac based products from India are presented in Fig. 5.

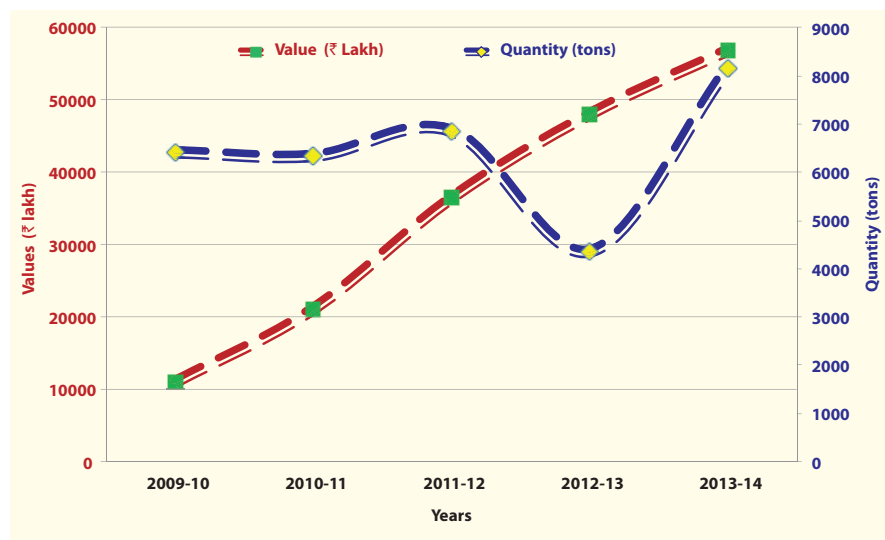


Fig. 5. Trends in export of lac based products from India

Organizational and infrastructure arrangements

Lac production will have to be slowly geared towards precision farming systems incorporating supplementary components. Raising plantations of quick growing plants like *ber* and *F. semialata* can contribute to development of resources base for enhanced and sustainable lac production. Demand for natural resins is increasing for applications related to food, pharmaceuticals, cosmetics, etc. Impact of global warming is bound to have its impact on lac insect populations and associated biotic complex, which can be seen in the form of direct impact of erratic weather conditions on the lac insect, unusual lac pest flare-ups, host reactions detrimental to lac insects, etc. Suitable strategies need to be developed to mitigate the adverse impact of such events. It is also a challenging issue for the research and development in view of the psycho-socio-economic characteristics of the farming population. Field crop-centric agro forestry models need to be developed by integrating appropriate lac hosts and gum producing trees. Choice of multipurpose trees would ensure enhanced benefits to the farmers.

ICAR-IINRG, TRIFED, JASCOLAMPF, State Governments of Jharkhand, Chhattisgarh, Madhya Pradesh, Andhra Pradesh and Maharashtra are coordinating the lac related activities like production, processing, marketing, training, research and development. The major activities of these organizations are given in Table 4.

Table 4. NRG related institutional network in India and their activities

Sl.	Activities accomplished by the various institutions
1.	ICAR-Indian Institute of Natural Resins and Gums (ICAR-IINRG), Ranchi, Jharkhand.
	<ul style="list-style-type: none"> ▪ To plan, conduct and promote research on lac production for productivity improvement; ▪ To plan, conduct and promote research on NRG processing technologies for value addition. ▪ Dissemination of technologies among stakeholders.
2.	The Tribal Cooperative Marketing Development Federation of India Limited (TRIFED), New Delhi.
	<ul style="list-style-type: none"> ▪ To undertake marketing development of the tribal products through self help and mutual cooperation. ▪ Functioning as a service provider, facilitator, coordinator and a market developer for tribal products.
3.	The Jharkhand State Co-operative Lac Marketing & Procurement Federation Ltd. (JASCOLAMPF), Ranchi, Jharkhand.
	<ul style="list-style-type: none"> ▪ Overall, development of lac industry in the tribal dominated region of the state.. ▪ To make its efforts towards encouraging lac cultivation as a source of earning to tribal economy. ▪ To buy sticklac from growers through primary cooperative societies.
4.	Chhattisgarh State Minor Forest Produce (Trading & Development) Co-operative Federation Limited (CGMFPF) Raipur, Chhattisgarh.
	<ul style="list-style-type: none"> ▪ To collect, promote trade and development of minor forest produce including other medicinal and aromatic plants in the interest of MFP collectors, mostly tribals of the state. ▪ To promote minor forest produce based cultivation and processing units.
5.	The Madhya Pradesh State Minor Forest Produce (Trading & Development) Co-operative Federation (MFPF) Bhopal, Madhya Pradesh.
	<ul style="list-style-type: none"> ▪ To co-ordinates collection and processing of MFPs in the State. ▪ To promote processing and marketing of herbal products (Vindhya Herbals)
6.	The Girijan Co-operative Corporation Ltd. (GCC) Visakhapatnam, Andhra Pradesh.
	<ul style="list-style-type: none"> ▪ To achieve the socio-economic development of tribals in the State. ▪ To procure of non-timber forest produce and agricultural produce from the tribals and marketing ▪ To supply of essential commodities under Public Distribution System (PDS) and other Domestic Requirements (DR) to the tribals at fair and reasonable prices. ▪ To provide financial assistance to tribals to enable them to execute seasonal agricultural operations.
7.	Kovel Foundation, Visakhapatnam, Andhra Pradesh.
	<ul style="list-style-type: none"> ▪ To impact poverty and power imbalances inherent in trade relationships, through the development, acquisition and transfer of sustainable technologies; ▪ To build up strong producers' centric institutions to make technology and markets work for the tribal communities.
8.	Sahayog Community Coordination Network (CCN), Visakhapatnam, Andhra Pradesh.
	<ul style="list-style-type: none"> ▪ To support lac farmers to adapt efficient and effective lac cultivation practices, ▪ To develop lac-based marketable end products, and ultimately empower tribal communities and groups through collective enterprises.
9.	DIC, Puruliya, West Bengal.
	<ul style="list-style-type: none"> ▪ To promote Small Scale Industries for entrepreneurship development. ▪ To identify and selection of potential entrepreneurs for training and motivational activities. ▪ To meet and discuss with the local people and artisans to make aware and motivate them.

There is need for proper attention and action for intensification of efforts for increasing lac production, exploitation of untapped potential areas for lac production and more research and development supports to lac growers for improving the socio-economic condition of lac growers and increase the lac production. There is also need for strengthening and widening the extension activity so that majority of lac growers can be empowered with scientific knowledge on lac cultivation for increasing their income and improve their livelihood. The demand for lac can be sustained and enhanced only if assured good quality supply with stable price maintained through a value chain. This requires appropriate transformations in the lac production sector as well as to meet the growing world demand. Value addition of lac at village level, standardization of weight, price stabilization, credit facility etc. will certainly improve the existing marketing system of lac. Proper marketing system will be helpful for providing fair price to the lac growers.

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