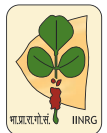


Lac, Plant Resins and Gums Statistics 2014 : At a Glance



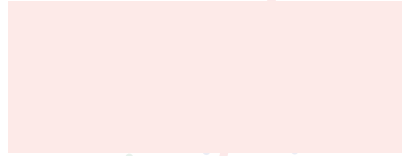
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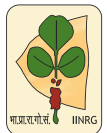
Lac, Plant Resins and Gums Statistics 2014 : At a Glance



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Left to right : Column 1 - *Kusmi* lac production on semialata plant; Column 2 - Lac processing industry; Column 3 - Marketing of gum *arabic*; Watermark - Production and EXIM trend of *guar* gum.

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Foreword

Natural resins and gums (NRGs) including lac form valuable means of subsistence, employment, cash income to growers / collectors and serve as a raw material for a number of industries. Production of such natural products is greatly influenced by vagaries of weather and prices. Therefore, statistics of these commodities are sought by the traders, processors, exporters, importers, government officials, policy makers, researchers and others. The ICAR-Indian Institute of Natural Resins and Gums, Ranchi has long been publishing annually 'Lac Statistics'; to make this publication more useful, we have also included plant resins and gums statistics from primary and secondary sources since 2011 onwards. The present publication, 'Lac, Plant Resins and Gums Statistics 2014: At a Glance' contains statistics on geographical distribution, production, price, processing, export and import of natural resins and gums including lac, pine resins, *guar* gum, *karaya* gum, *dhawda* gum, etc. The details of area, production and yield of *guar* seed are also presented. The production of gums in important States, viz, Chhattisgarh, Madhya Pradesh, Gujarat and Andhra Pradesh; production of pine resins in Uttarakhand and Himachal Pradesh; export and import of natural resins and gums is included to give a clear and comprehensive overview of the most important informations. Reliable and timely availability of data and information on natural resins and gums production will be helpful to the stakeholders, and documentation of updated major production and market areas will plan their operation in time for collection and disposal of the produces. This publication is comprehensive treatment of non-wood forest products in India. It having a strong focus on the markets and potential markets for these products. It will be useful to private sectors who are interested in increasing their income and widening its base. In this issue, content is presented in five major headings covering introduction; methodology; production, processing and trade; policy implications and conclusion. We believe it will contribute to the development of a sector that has huge untapped potential in an assortment of directions. I am sure that the information and data contained in this bulletin would be useful to all the stakeholders of NRG sector. Authors have made every effort to distill and condense a very large and diverse topic into an approachable volume. I exalt the authors for their efforts in bringing out this bulletin. Suggestions and inputs are sought from stakeholders for improvement of this publication in future; the informations used in the publication will be duly acknowledged.

Ranchi

(K K Sharma)
Director

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INTRODUCTION

Along with the remarkable economic growth and industry development, India has become one of the largest producers, consumers and traders of Non-Wood Forest Products (NWFPs) in the world. This rapid development has led to substantial changes in the global picture of NWFPs trade and has drawn attention to the future demand and supply on a global scale. India is a diverse tropical (dry and wet) country of approximately 1252 million people. Forest cover is about 21.23 per cent (FSI, 2013) of the total geographical area. Forest is an important sector having a significant contribution to the Indian economy. Forest industry contributes to 1.2 per cent of India's Gross Domestic Product (Economic Survey, Ministry of Finance, 2011). It is estimated that of the 6.2 billion people on the planet, 25 per cent depend to varying degrees on the forest resources for their livelihood and 350 million people living in or near dense forest areas and depend highly on them for their subsistence or livelihood (Killman, 2003). About 80 per cent of the people living in developing countries depend on non-wood forest products, such as fruits and herbs, for their primary health and nutritional needs (FAO, 2008).

Indian subcontinent is a major hub of biodiversity of fauna and flora. Several forest products have significant importance in social and economic life in tropical areas. These forest products are classified into wood and Non-Wood Forest Products. NWFP includes natural resins, gums and exudates, leaves (tendu), turpentine from pines and perfumery oils from roots, stumps and fruits of various tree species. These are also natural source of spices, medicines, dyes and tannins. Most NWFPs are export currency earners and many are well suited for local small scale industries. According ITC calculations based on UN COMTRADE statistics, the world export aggregation of lac, natural gums, resins, gum-resins and balsams during 2013 was about 810.1 million US dollars. Major suppliers of NRGs contributing about 91 per cent share in international market are India (18.6 %), France (15.7 %), Sudan (14.4 %), Thailand (5.0 %) United States of America (4.9 %), Afghanistan (4.8 %), Indonesia (4.5 %), United Kingdom (4.4 %), Germany (3.9 %), Chad (3.6 %), China (1.7 %), Netherlands (1.6 %), Brazil (1.5 %), Nigeria (1.5 %), Greece (1.5 %), Singapore (1.4 %), Iran (1.3 %) and Italy (1.1 %). Rests of the 9 per cent NRGs are supplied from more than 100 countries across the world.

FAO estimated that NWFPs are capable of generating 4 million man-years of employment annually (FAO, 2002; FAO, 2005). In India over 50 million people

are dependent on NWFPs for their subsistence and cash income (Hegde *et al.*, 1996). About 70 per cent of the NWFP collection in India takes place in the tribal belt of the country (Mitchell *et al.*, 2003). Around 55 per cent of employment in forestry sector is attributed to this sector alone (Joshi, 2003). India holds monopoly in world trade over some of the Natural resins and gums (NRGs) such as lac (*Kerria lacca* Kerr), *karaya* gum (*Sterculia urens*) and *guar* gum (*Cyamopsis tetragonoloba* L.).

There are a large number of lac host and gum producing trees in India which exude resins and gums. NRGs originated from the plants/insects may be classified in three categories namely natural resins, natural gums and gum resins. Natural resins are solid or semi-solid materials, usually a complex mixture of organic compounds called terpenoides, which are insoluble in water but soluble in certain organic solvents. Resin is a hydrocarbon secretion of several plants, particularly coniferous trees. Resins are valued for their chemical properties and associated uses such as the production of varnishes, adhesives and food glazing agents. These are also prized as an important source of raw material for organic synthesis and as constituents of incense and perfume. This group of natural resins includes lac secreted by an insect *K. lacca* (Kerr) and plant originated products like rosin, copal and dammer. Solidified resin from which the volatile terpene components have been removed by distillation is known as rosin. Natural gums are polysaccharides of natural origin, capable of causing a large viscosity increase in solution. Most often these gums are found as exudates from woody elements of plants or in seed coatings. In the food industry these are used as thickening, gelling and emulsifying agents and stabilizers. These are also used as adhesives, binding agents, crystal inhibitors, clarifying agents, encapsulating agents, flocculating, foam stabilizers, swelling agents, *etc.* Natural gums can be classified according to their origin. Firstly, originated from non-marine botanical resources *e.g.* gum *arabic*, gum *ghatti*, gum *tragacanth*, *karaya* gum, *guar* gum, locust bean gum, *chicle* gum, *dammar* gum, *mastic* gum, psyllium seed husks and spruce gum. Secondly, originated from seaweeds *e.g.* agar and *carrageenan* and thirdly, produced by bacterial fermentation *e.g.* *gellan* gum and *xanthum* gum. They can also be classified as uncharged or ionic polymers (polyelectrolyte).

NRGs of commercial importance like lac, rosin, *guar* gum (*C. tetragonoloba* L.), *karaya* gum (*S. urens*), *dhawada* gum (*Anogeissus latifolia*), *salai* gum (*Boswellia serrata*), *char /piyar* gum (*Buchanania lanzan* Spreng.) and *babool* gum (*Acacia nilotica*) are produced in India. Gum-resins are the natural mixtures of gums and



resins in variable proportions therefore possess properties of both the groups. They contain traces of essential oils and are partly soluble in water. They have a penetrating and characteristic odour and taste. These are obtained from the plants. Asafoetida, guggal, olibanum, *etc.* are the major gum resins of national importance.

METHODOLOGY

Reliable and periodical assessments of quantities and values of production and market outlook studies at the national level of NWFPs are essential to decision-makers for policy formulation and governing the sustainable development of the sector. Appropriate and biometrically valid inventories of non-wood forest resources are an essential prerequisite for their sustainable management and harvesting. However, methodologies for the precise assessment of forest resources yielding NWFPs are not yet sufficiently elaborated, neither can they be easily implemented by resource managers in the field. Timely and accurate estimation of production may be helpful for the stakeholders to plan their operations in time. Accuracy in production estimate would be helpful in precision planning by all concerned. Besides knowing the present status, it would be helpful in regulating imports, planning for enhanced exports, reasonable prices and reliability in supply of lac based products. However, such statistics do not yet exist for most countries, neither is the already available data comparable among countries. In most countries, the current coverage and quality of existing information is inadequate for policy analysis and decision making at national level.

FAO currently assists national governments and institutions to improve the availability of national qualitative and quantitative data related to NWFPs. These efforts include: the development of a standard framework that describes the key information required for the evaluation of NWFPs utilization at the country level; the improvement and elaboration of methodologies for the collection and validation of the required information—including more precise product nomenclature and corresponding product classification; and the compilation of standardized national reporting formats on NWFPs. From the lessons learned by implementing this national survey, specific case studies to improve NRGs data gathering methodologies are being carried out in selected states (Jharkhand, West Bengal, Chhattisgarh and Madhya Pradesh). Hence, under the research project “Market research for production and marketing of natural resins and gums” a standard reporting format has been developed to assist in recording statistics on the production and trade of major NRGs. This approach was used in order to compile NRGs state profiles for all states of India. The result of this national assessment has been published annually as a separate chapter of the Agricultural Research Data Book, ICAR-IASRI, New Delhi.

The objectives of present methodology are to estimate and update the production and processing of NRGs at national level and to compile the latest EXIM data. The approach used in the present methodology was through survey of local traders and processors, as all NRGs produced in India is collected/procured through the local traders/societies/forest departments.

Big traders/federations are limited in number and they have close contact with the primary purchaser who have knowledge of present crop condition and expected output. Survey of all big traders was helpful in estimation. Further, all the produced products passes through the processing units. Processors use the current harvested or stocked or imported crop/produce. Survey of processing units was helpful in estimating quantity of processed products at national level and validation of production data. Information on market arrival during seasons at important markets in India was collected through survey of identified major markets. Regular contacts were also made with the persons/ organizations related to NRGs in India through correspondence, phone and personal visit for collection and updating of data. Production estimation was made by the survey of selected processors, exporters, importers and markets (traders). Export and import NRGs related products were obtained from Directorate General of Commercial Intelligence and Statistics (DGCI&S), Kolkata. Five schedules / questionnaire were framed for collection of data and information during the field surveys *i.e.* survey of markets, survey of processing centers, crop-wise arrival in the market, survey of importers and processing at processing centers. Production year was considered from April to March (Financial year) and final production assessment completed by the month of April. Data and other related information for estimation of production and processing was collected throughout the year. Tabular analysis and pictorial presentation has been used to analyze the survey data. Validation of production data at national level was made by quantity processed at national level, export and import figures.

Sampling design and survey area

National level information and data on NRGs were collected from primary and secondary sources. Survey was made in various NRG producing areas of the country for collection of data throughout the year during 2013-14. The requisite data has been collected from respondents at various NRGs markets and processing centers. For updating the information and data, regular telephonic contacts were also made with the respondents.

Surveys were conducted in 40 NRG producing districts of 12 states covering 675 stakeholders including 80 institutions, 339 farmers, 52 traders, 69 processors/wholesalers/exporters, 135 resource persons were interacted through visits telephonic conversations during 2013-14. Name of the states and districts which were covered for survey and sample size surveyed during the year have been presented in Table-1 and Table-2, respectively.

Table 1. States and districts surveyed

Sl. No.	States	Districts
1.	Chhattisgarh	Bilaspur, Dhamtari, Janjgir-Champa, Kanker, Korba, Mahasamund, Raigarh and Raipur
2.	Gujarat	Vadodara
3.	Jharkhand	Garhwa, Gumla, Khunti, Latehar, Palamau, Ranchi, Simdega and West Singhbhum
4.	Madhya Pradesh	Balaghat, Jabalpur and Seoni
5.	Maharashtra	Bhandara Chandrapur Garhchiroli and Gondia,
6.	NEH region	Boko, Dimapur, Kamrup and Karbi-Anglong
7.	Odisha	Balasore, Bhubaneswar, Kalahandi, Keonjhar, Koraput, Mayurbhanj and Sundergarh
8.	West Bengal	Bankura, East Midnapur, Purulia , South 24 Pargana and West Midnapur
9.	Other states	Ajmer, Jaipur, Jodhpur, Muzaffarapur, Vishakhapatnam, etc.

Table 2. Sample size during the survey

States	Number of districts	Total number of respondents			
		Number of traders	Number of manufacturers	Govt. Officials/ NGOs/ Other key informants	Total
Andhra Pradesh	1	0	0	15	15
Bihar	1	0	0	25	25
Chhattisgarh	9	5	20	40	65
Gujarat	2	2	0	9	11
Jharkhand	9	6	6	87	99
Madhya Pradesh	3	10	1	20	31
Maharashtra	4	10	11	200	221
NEH	3	5	0	128	133
Odisha	1	0	0	2	2
Rajasthan	4	4	10	10	24
Telengana	1	0	0	08	08
West Bengal	2	10	21	10	41
Total	40	52	69	554	675

PRODUCTION, PROCESSING AND TRADE IN NRGs

NRG production level during 2013-14 was estimated comparatively higher (1160314.1 tons) than previous year (837582.8 tons). Other resins and gum production declined during the current year. Production and trade of NRGs including *guar* gum, lac, pine resin, *karaya* gum, *dhawda* gum and other natural resins and gums is depicted in Table 3 and Figure 1.

Table 3. Total NRG production and trade during 2013-14 (quantity in tons)

Sl. No.	Name of product	Production	% share	Export	% share	Import	% share
1.	<i>Guar</i> gum*	1129478.3.0	97.34	469850.7	97.27	314.2	0.35
2.	Lac	21008.0	1.81	8158.1	1.69	0.0	0.00
3.	Pine resin	7900.0	0.68	192.1	0.04	36859.4	41.17
4.	<i>Karaya</i> gum	258.2	0.03	517.1	0.10	421.8	0.47
5.	Other NRGs	1669.6	0.14	4342.8	0.90	51940.6	58.01
	Total	1160314.1	100.00	483060.9	100.00	89535.9	100.00

*Estimation of *guar* gum is based on the conversion of total *guar* seed production

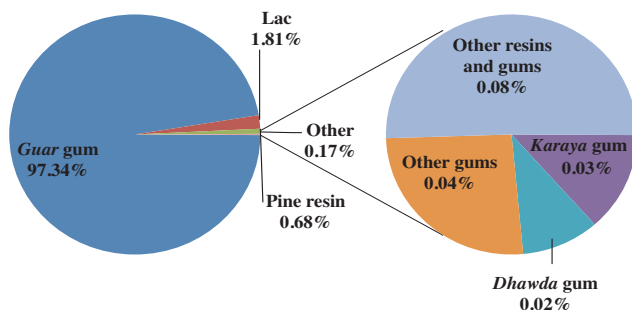


Figure 1. Product/major group-wise production share of NRGs

It is evident from the Table that *guar* gum has a lion share in total NRG production and consequently in export also. For *guar* gum, India is the leading producer, processor and exporter country in the world. Hence, a negligible quantity has been

imported for research and other purposes. Similarly, India is the largest producer, processor and exporter of the lac. Export quantity of lac has been increased by 87 per cent in comparison to previous year export. However, the increase in value of exported lac was only 18 per cent. About 1.5 per cent production of the total NRGs is contributed by pine resins, *karaya* gum and other natural resins and gums. Export under these commodities/groups has exceeded the production data. There may be two reasons, first the exported quantity supplied from the carry over stock and secondly, raw material imported and exported after processing in India. Overall, there was about 42 per cent increase in total quantity of NRGs exported and quantity in import basket was almost stable. But, price fall of *guar* gum in international market resulted with a decline of 44 per cent in total foreign exchange earnings as comparison to 2012-13. The detailed information about state-wise production processing and trade of natural resins (lac, pine resin), natural gums (*karaya* gum, *guar* gum, psyllium gum) and natural gum resins (Myrrh, asafetida) is presented below.

Lac – a fauna based natural resin

Lac is a natural resin secreted by an insect *K. 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.* Raw lac is the source of three valuable, natural and renewable products i.e. resin, dye and wax. *Rangeeni* and *kusmi* are the two strains of lac insect which are classified based on preference of the insect for specific host plants.



Figure 2. Indigenous method of handmade shellac

Lac cultivation is an important source of income 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 subforest 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. Lac is mainly produced in India, Thailand, Indonesia, parts of China, Myanmar, Philippines, Vietnam, Cambodia *etc.* and India is the largest producer of lac in the world.

Lac production in India

In 1950s, the average production of lac in India was about 42320 MT and onward decline trend in lac production during 1970s (52 %), in 1980s (19 %) and 1990s (4 %) was observed. However, in revival period of 2000s, 24 per cent increase was recorded. During this decade the efforts in terms of policy, research and development regarding the lac sector percolated at grass root level and interest of stakeholders had got the vital support. At present only less than 5 per cent lac host trees are under the lac cultivation. It is assumed that there are some bottlenecks hampering the growth of the sector.

Estimation of lac production is required by the Government, lac-based industries, lac traders, entrepreneurs and exporters. The lac growers, processors, traders, exporters and policy makers can plan their operations in time by using timely and accurate estimations. The cultivation of lac on a large number of hosts of different kinds, its collection by numerous small growers, variations in the yield depending on the type and size of the host, cultivation practices and climatic conditions are the major factors influencing the estimation of lac production. Accuracy in production estimate would be helpful in precision planning by all concerned. Besides knowing the present status, it would be helpful in regulating imports, planning for enhanced exports, reasonable prices and reliability in supply of lac based products.

On the basis of survey in the markets of different lac producing districts and states, the estimated national production of sticklac during 2012-13 was approximately 21,008 tons. Jharkhand state ranks 1st followed by Chhattisgarh, Madhya Pradesh, Maharashtra and Odisha. These five states contribute around 95 per cent of the national lac production (Figure 3.). Contribution of Jharkhand in national lac production is about 58 per cent followed by Chhattisgarh (16.1 %), Madhya Pradesh (11.9 %), Maharashtra (5.6 %) and Odisha (3.2 %). *Jethwi* crop ranked 1st with the contribution of 35.8 per cent followed by *baisakhi* (24.9 %), *aghani* (24.0 %) and *katki* (15.3 %) in total lac production. In the year 2013-14, production of all the crops in comparison to previous year production has been increased and the increase was 18.8, 5.8 and 5.5 per cent for *jethwi*, *katki* and *aghani* crops, respectively. However, a decline of 3.6 per cent was observed in case of *baisakhi* crop.

Table 4. Lac production in India during 2013-14 (in tons)*

Sl. No.	Name of the state	Name of lac crop®				Total
		Baisakhi	Jethwi	Katki	Aghani	
1.	Jharkhand	1235	6280	1080	3612	12207
2.	Chhattisgarh	885	855	635	1006	3381
3.	Madhya Pradesh	1910	48	468	71	2497
4.	Maharashtra	625	0	557	0	1182
5.	Odisha	87	251	65	270	673
6.	West Bengal	185	60	180	75	500
7.	Meghalaya	160	0	8	0	168
8.	Assam	50	0	100	0	150
9.	Andhra Pradesh ^s	40	2	70	1	113
10.	Uttar Pradesh	40	0	50	0	90
11.	Gujarat	10	30	2	5	47
	TOTAL	5227 (24.88)	7526 (35.82)	3215 (15.31)	5040 (23.99)	21008 (100.00)

@**Baisakhi**: - Summer season crop of rangeeni; **Jethwi**: - Summer season crop of kusmi; **Katki**: - Rainy season crop of rangeeni; **Aghani**: - Winter season crop of kusmi; ^s Andhra Pradesh including Telengana;

* See Table 31 for details.

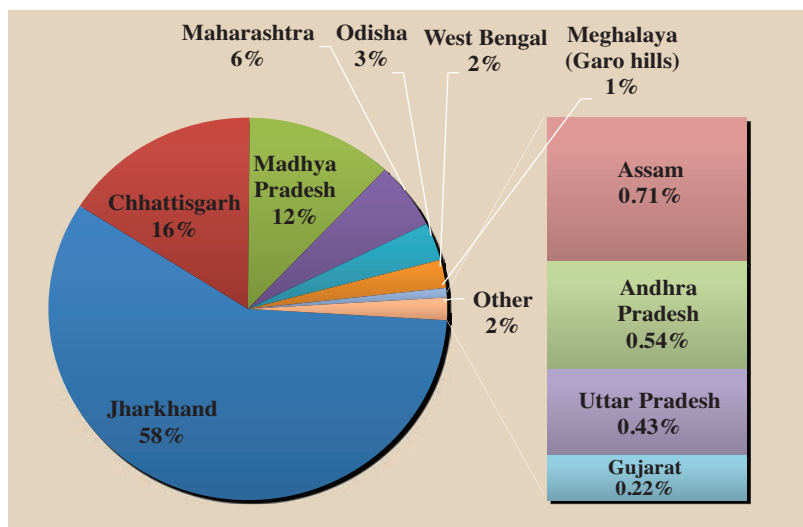


Figure 3. States-wise share in lac production during 2013-14

At national level, the production of lac was around 7.3 per cent more than the previous year. Lac production scenario in India and districts producing over 1000 tons of lac during 2013-14 are presented in Table 4 and Table 5, respectively. Share of different crops at national level is presented in Figure 4. Lac production in India during previous five years is depicted in Figure 5.

Table 5. Districts produced over 1,000 tons of lac

Sl. No.	District (States)	2012-13	Rank	2013-14	Rank
1.	Ranchi (Jharkhand)	4250	1	3475	1
2.	Simdega (Jharkhand)	2720	2	2445	2
3.	Gumla (Jharkhand)	2270	3	2380	3
4.	Khunti (Jharkhand)	-	-	1790	4
5.	Seoni (Madhya Pradesh)	1115	4	1185	5
6.	Gondia (Maharashtra)	1000	5	1010	6
7.	Korba (Chhattisgarh)	-	-	1000	7

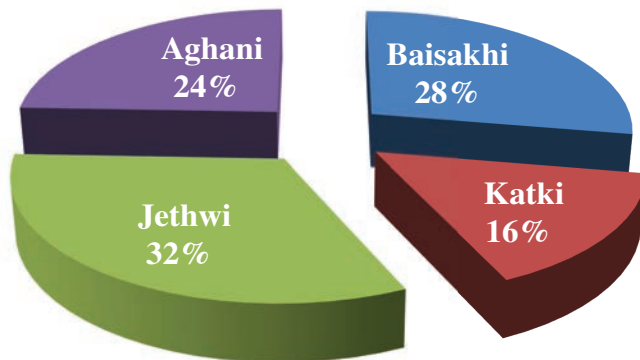


Figure 4. Crop-wise share in total lac production

The overall, production of the lac in the country has been estimated to be 21,008 tons which is higher than the previous year production (19,577 tons). The production was under-estimated in West Bengal, Uttar Pradesh, Madhya Pradesh and Gujarat. During, current year 2013-14, the lac production tends to the level of the bumper production years during last 33 years. It is interesting to mention that the production level of lac had increased from the lowest level of 9,035 tons

during 2010-11 to 17,900 tons (about 100 % increase) during 2011-12 and about 21,008 tons during the second year of XII plan period. District wise lac production statistics and major lac producing areas in the country are presented in Table-31 and Table-32, respectively.

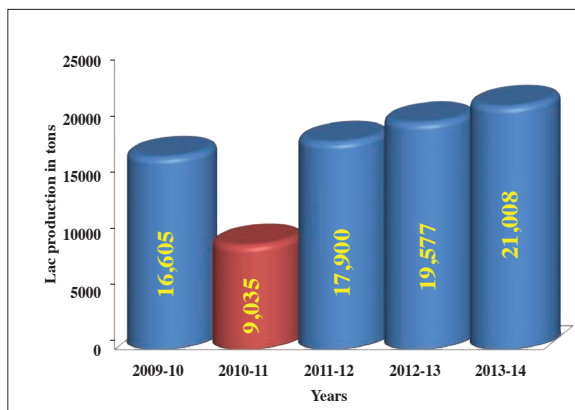


Figure 5. Lac production in India during previous five years

Lac processing and value addition in India

Sticklac in small quantity or lots is generally sold in the rural markets (*haats*) by the lac growers. Rural markets (*haat*) in remote lac growing areas operate once or twice in a week. Lac growers, after harvesting sticklac sell to *paikars* (primary purchasers). Lac growers, nearer to lac processing units, also sell their produce directly to processing units. The *paikars* after collecting, whatever quantity they get in the course of the market day, sell it to the wholesaler in the same market or nearby manufacturing centers in bigger lots. Simultaneously, the wholesalers sell the produce to manufacturers at different lac processing centers. After processing, lac is sold for internal consumption within the country or exported by lac exporters.

On the basis of surveys conducted at different lac processing centers in the country, the total quantity of sticklac processed during 2013-14 was 22149 tons which also included the imported lac and previous carry over stock in India. Information about share of different states in lac processing is presented in Figure 6 and amount of lac processed in India during previous five years is depicted in Figure 7.

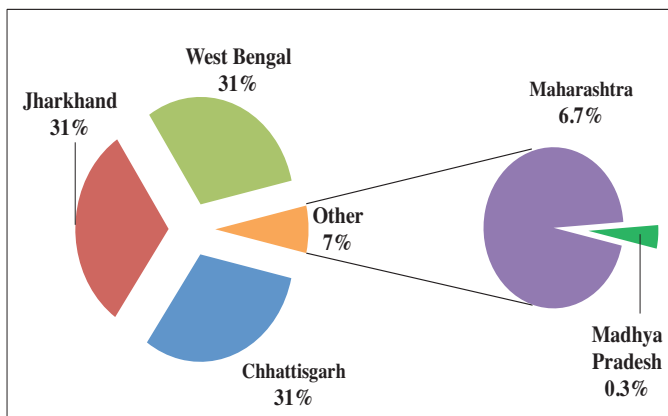


Figure 6. States-wise share in lac processing during 2013-14

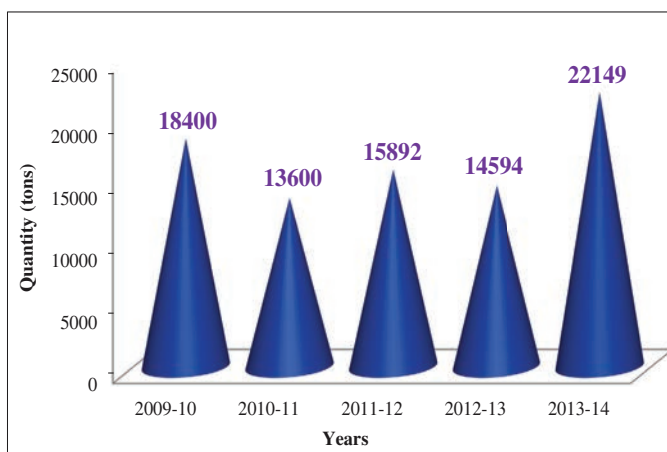


Figure 7. Lac processing in India during last five years

Lac processing centers in India and amount of sticklac processed at different lac processing centers in the country during 2013-14 are presented in Table 6 and Table 7, respectively. A total 155 lac processing units were functional in West Bengal (102), Chhattisgarh (29), Jharkhand (16), Maharashtra (6) and Madhya Pradesh (2) during the year 2013-14. In the processing of lac across the country, Chhattisgarh (31 %), West Bengal (31 %) and Jharkhand (31 %) shared equally about 93 per cent followed by Maharashtra (6.7 %) and Madhya Pradesh (0.3 %). There were 8 primary and 6 secondary markets existing at national level, in which annual arrival of sticklac was more than 500 tons.

Table 6. Major lac processing centers in India during 2013-14

Sl. No.	States	Districts / Centres	No. of processing units	Products made
1.	Chhattisgarh	Dhamtari	10	Seedlac, Button lac, Bleached lac, Aleuritic acid
		Janjgir-Champa (Sakti)	5	Seedlac, Shellac, Bleached lac, Dewaxed Shellac, Lac dye
		Kanker	2	Seedlac
		Korba (Kathgora)	10	Seedlac, Shellac, Bleached lac, Button lac (newly started)
		Rajnandgaon	1	Seedlac, Shellac
		Raipur	1	Bleached lac, Aleuritic acid
2.	Jharkhand	Daltonganj	2	Seedlac
		Ranchi (Khunti, Bundu, Murhu)	10	Seedlac, Button lac, Shellac, Lac dye, Bleached lac
		Simdega	2	Seedlac
		Saraikela-Kharsawan (Chandil)	1	Bleached lac
		West Singhbhum (Chakradharpur)	1	Shellac
3.	Madhya Pradesh	Indore	1	Seedlac, Bleached lac
		Hoshangabad (Bankhedi)	1	Seedlac
4.	Maharashtra	Gondia	6	Seedlac, Shellac, Gasket Shellac Compound, Bleached lac
5.	West Bengal	Purulia (Balarampur)	70	Seedlac, Shellac, Button lac, Bleached lac, Aleuritic acid, lac wax, Dewaxed Decolourised lac
		Purulia (Jhalda)	3	Seedlac, Shellac, Button lac
		Purulia (Tulin)	29	Seedlac, Button lac
TOTAL			155	

Table 7. Quantity of sticklac processed in India during 2013-14

Sl. No.	States	Districts/ Centres	Quantity processed (tons)	% change over last year
1.	Chhattisgarh	Dhamtari	2600	8.3
		Janjgir-Champa (Sakti)	800	63.3
		Kanker	600	114.3
		Korba (Kathgora)	2800	16.7
		Rajnandgaon	100	100.0
		Sub total	6900	22.6
2.	Jharkhand	Daltonganj	400	100.0
		Ranchi (Khunti, Bundu)	5100	70.0
		Saraikela-Kharsawan (Chandil)	105	250.0
		Simdega	1200	252.9
		West Singhbhum (Chakradharpur)	60	500.0
		Sub total	6865	91.8
3.	Maharashtra	Gondia	1500	66.7
4.	Madhya Pradesh	Indore	56	-6.7
		Bankhedi	18	-10.0
		Sub total	74	-7.5
5.	West Bengal	Purulia (Balarampur)	6500	55.4
		Purulia (Jhalda)	160	60.0
		Purulia (Tulin)	150	25.0
		Sub total	6810	54.6
		Total	22149	51.8

Name of the primary and secondary markets with annual arrival of over 500 tons and district wise lac processing centres across major lac producing districts of India are presented in Table 8 and Table 9, respectively.

Table 8. Markets with annual arrival of over 500 tons during 2013-14

Sl. No.	States	Primary markets	Secondary markets
1.	Chhattisgarh	Bhaisama Bazar	Dhamtari, Kathgora and Sakti
2.	Jharkhand	Bandgaon, Jaldega and Kolebira	Khunti
3.	Maharashtra	Barghat region	Gondia
4.	West Bengal	Balarampur, Jhalda and Tulin	Balarampur

Table 9. Lac processing centers in the major lac producing districts of India

Sl. No.	Classifications (Qty. in tons)	No. of districts	No. of processing centers	Name of the districts
1.	> 1,000	07	28	Gumla, Khunti, Ranchi & Simdega (Jharkhand); Seoni (Madhya Pradesh); Gondia (Maharashtra) and Korba (Chhattisgarh)
2.	500-1000	03	03	West Singhbhum (Jharkhand); Balaghat (Madhya Pradesh) and Kanker (Chhattisgarh)
3.	250-500	02	02	Palamau (Jharkhand) and Sundergarh (Odisha)
4.	100-250	12	119	Bilaspur (Chhattisgarh); Midnapur (West Bengal); Mahasamund, Raipur, & Rajnandgaon (Chhattisgarh); Purulia (West Bengal); Bastar, Dhamtari, Janjgir-Champa & Surguja (Chhattisgarh); Mayurbhanj (Odisha) and Mandla (Madhya Pradesh)
5.	1- 100	19	1	Balasore, Keonjhar, Koraput & Nabarangpur (Odisha); Bhandara, Chandrapur & Garhchiroli (Maharashtra); Ambikapur, Durg & Raigarh (Chhattisgarh); Garhwa & Latehar (Jharkhand); Anuppur, Chhindwada, Dindori, Hosangabad, Narshinghpur & Shahdol (Madhya Pradesh) and Bankura (West Bengal)
6.	< 1	30	2	Rest of the districts in Assam, Andhra Pradesh Bihar , Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Meghalaya, Odisha, Uttar Pradesh, Telangana and West Bengal
	Total	73	155	

Movement in price of lac over the period

The data on prices of *rangeeni* and *kusmi* sticklac and seedlac have been collected from the lac markets (Balarampur, Purulia, West Bengal) on quarterly basis. The trend in movement of lac prices have been presented in Figure 8. The prices of *rangeeni* and *kusmi* sticklac as well as seedlac has shown increasing trend from December, 2009 to December, 2012, respectively. Prices rose sharply during the period, due to less production of lac in other lac producing countries during the year 2010-11. Consequently, poor import was observed during previous two years. Regular export demand of lac and low carryover stocks from previous years dragged up the price level. Subsequently, harvesting of good lac crop was observed during the previous three years 2011-12 to 2013-14 and crop was supplied to the market. It was observed that prices of sticklac and seedlac started to decline onwards of December, 2012. Here, at this stage of dip in price level, TRIFED, Ministry of Tribal Affairs, Government of India, New Delhi appeared with a policy for price stability and ICAR-Indian Institute of Natural Resins and Gums, Ranchi provided the technical guidance to the pricing cell of TRIFED for estimation of the cost of lac cultivation. Government announced Minimum Support Price (MSP) for both *kusmi* and *rangeeni* crop of lac, so that lac growers can get remunerative price during poor market demand or bumper production period. Pricing Cell had recommended the Minimum Support Price (MSP) of ₹ 230 and ₹ 320/kg for *rangeeni* and *kusumi* lac, respectively for 2015 crop.

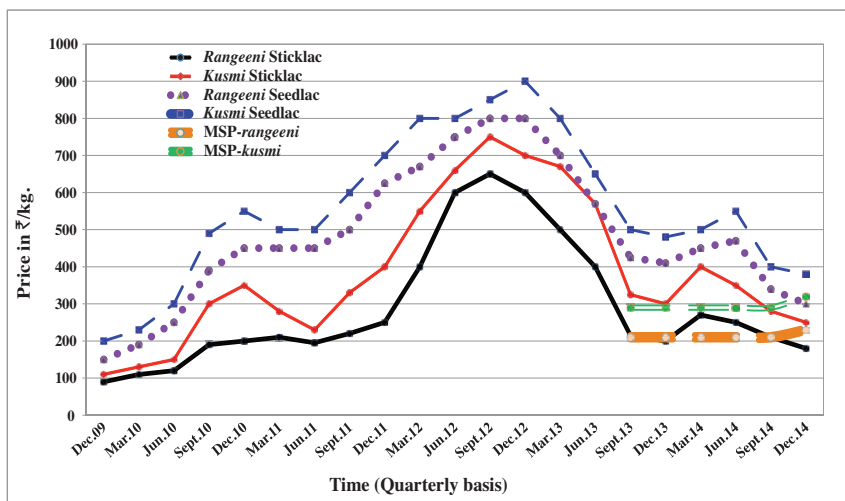


Figure 8. Movement in prices of sticklac and seedlac

International trade of lac and its value added products

Data on export of lac and its value added products from India were collected from Shellac and Forest Products Export Promotion Council (SHEFEXIL), Kolkata. The total export of lac and its value added products during the year 2013-14 was 8153.10 tons which was valued ₹ 568.53 crores. Details of export in quantity and value, list of top 15 countries importing Indian lac and export of lac has been presented in the Table 10 and Table 11 while the trend in export of lac in quantity and value during last seven years and share of different items of lac export from India are shown in Figure 9 and Figure 10, respectively.

Table 10. Export of lac and its value added products from India during 2012-14

Sl. No.	Name of product	Export in 2012-13		Export in 2013-14	
		Quantity (tons)	Value (₹ lakh)	Quantity (tons)	Value (₹ lakh)
1.	Shellac	2865.4	23744.4	3738.61	22556.46
2.	Aleuritic acid	162.4	10068.1	162.01	10054.42
3.	Seedlac	769.39	8422.49	3709.35	19803.33
4.	Dewaxed shellac	227.77	3066.53	211.04	1930.74
5.	Bleached lac	164.22	2082.03	258.29	2311.04
6.	Shellac wax	43.17	557.53	17.80	183.61
7.	Kiri lac	44.9	51.96	0.00	0.00
8.	Hydrolysed lac	78.9	25.17	56.00	14.03
9.	Gasket lac	5.18	9.2	0.00	0.00
10.	Lac dye	0.01	0.2	0.00	0.00
	Total	4361.30	48027.58	8153.10	56853.63

Lac is an important natural resins exported by and also imported (from Indonesia, Thailand, etc.) in India. During last 10 years exported value showed that 99.81 per cent contribution in natural resins export were from lac (90.47 %), other resins (5.59 %) and gum rosin (3.75 %). Average annual export quantity of lac during last 10 years (2002-03 to 2011-12) was 9156.75 tons worth ₹ 12,334.86 lakh. Similarly, the average annual export quantity of lac was 8,249.85 tons valued ₹ 17419.91 lakh during the period 1998-99 to 2012-13. However, during last 15 years growth in exported quantity was negative for lac and total natural resins group. But, in value terms the same figure has got a momentum of the significant growth rate of about 11 per cent with a high stability coefficient during the period 1998-99 to 2012-13.

Table 11. Top 15 importing countries of Indian lac during 2013-14

Sl. No.	Country	Quantity (tons)	Value (₹ lakh)	% Share
1.	USA	2539.54	14344.82	25.23
2.	Switzerland	102.00	6462.88	11.37
3.	Germany	782.11	5665.74	9.97
4.	Pakistan	1013.94	5626.74	9.90
5.	Bangladesh	1057.15	4169.23	7.33
6.	China	177.71	4121.79	7.25
7.	Egypt	441.48	2793.61	4.91
8.	Iraq	399.50	2368.53	4.17
9.	Indonesia	309.50	2098.47	3.69
10.	UK	124.80	1206.39	2.12
11.	Italy	200.10	1176.11	2.07
12.	Jordan	137.50	1063.21	1.87
13.	Spain	125.48	771.59	1.36
14.	Haiti	105.25	741.54	1.30
15.	Canada	72.45	513.56	0.90
16.	Others	569.60	3729.40	6.56
	Total	8158.10	56853.63	100.00

Table 12. Export of lac during XI plan and initial two years of XII plan

Sl. No.	Year	Quantity (tons)	Value (₹ lakh)
1.	2007-08	7906.33	12426.87
2.	2008-09	6968.42	12414.50
3.	2009-10	6422.61	11002.33
4.	2010-11	6339.05	21112.92
5.	2011-12	6858.21	36461.30
6.	2012-13	4361.30	48027.58
7.	2013-14	8158.10	56853.63

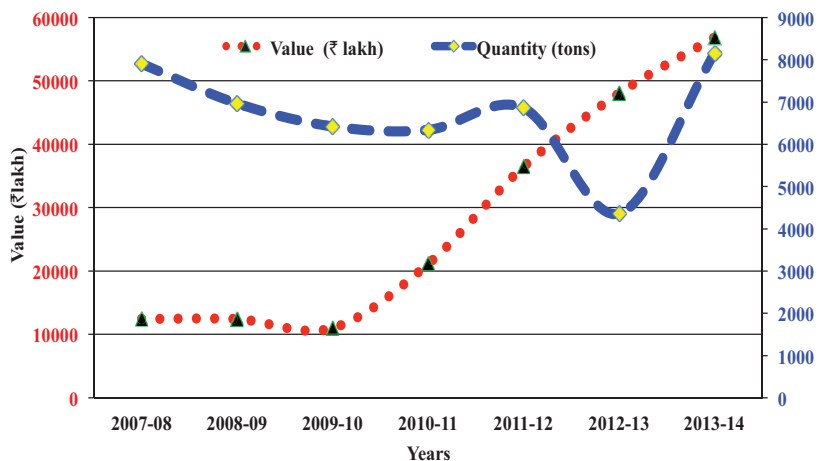


Figure 9. Trends in export of lac based products from India

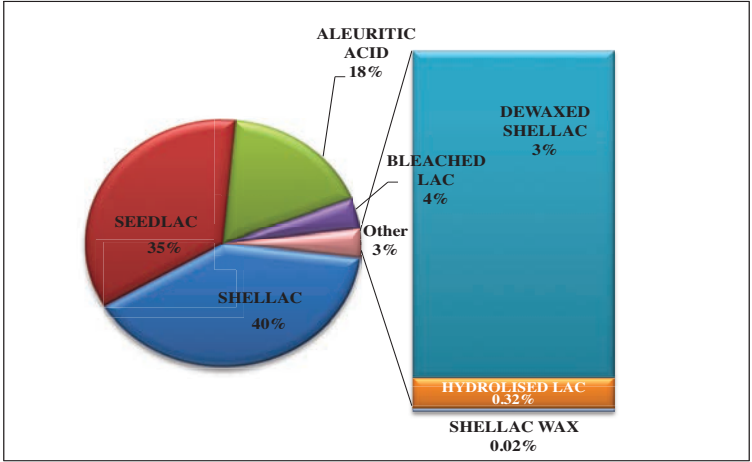


Figure 10. Product-wise export share of various lac based products (in value)

Pine resin –a flora based resin

Pine resins are secretion of plants, particularly coniferous trees. These are valued for their chemical properties and associated uses like production of varnishes, adhesives, and food glazing agents. Extensive chir pine forests are found in the Himalayas between an elevation of 1000 to 1900 m. Chir pine yields commercially important oleo-resin which forms the raw material for rosin and turpentine oil

industry in India. Chir pine is widely tapped for resin on commercial basis, particularly in the hills of Jammu & Kashmir, Himachal Pradesh, Uttarakhand and Arunachal Pradesh. Major share of resin production comes from Himachal Pradesh and Uttarakhand. Commercially tapped sources of pine resin are depicted in Table 13. The production of resin in the states during the year 2013-14 was about 8000 tons and about 85 per cent of this raw material is processed in the Rosin and Turpentine oil Factories (RTFs).



Figure 11. Pine resin collection using borehole method developed by the Institute

Table 13. Commercially tapped sources of pine resin: species and country of production

Sl. No.	Species	Producing country
1.	<i>Pinus caribaea</i> Morelet	Venezuela, South Africa, Kenya
2.	<i>P. halepensis</i> Miller	Greece
3.	<i>P. kesiya</i> Royale ex Gordon	People's Republic of China
4.	<i>P. massoniana</i> D. Don	People's Republic of China
5.	<i>P. merkusii</i> Jungh. & Vriese	Indonesia, Viet Nam
6.	<i>P. oocarpa</i> Schiede	Mexico, Honduras
7.	<i>P. pinaster</i> Aiton	Portugal
8.	<i>P. radiata</i> D. Don	Kenya
9.	<i>P. roxburghii</i> Sarg.	India, Pakistan
10.	<i>P. sylvestris</i> L.	Russia
11.	<i>P. elliottii</i> Engelm.	Brazil, Argentina, South Africa, USA, Kenya

Source: FAO, Rome, Italy

Pine resin production in India

Total annual production of rosin is about 1.0 million tons world-wide. Of this, it is estimated that almost 60 per cent, is gum rosin; most of the remainder, about 35 per cent is tall oil rosin and the rest is wood rosin.

World production of turpentine is approximately 3.3 lakh tons from all sources; an almost 1.0 lakh tons (30 %) is estimated to be gum turpentine, and the bulk of the remainder is sulphate turpentine. In India resin production and its value over the period of 2007-08 to 2013-14 is depicted in Figure 12.

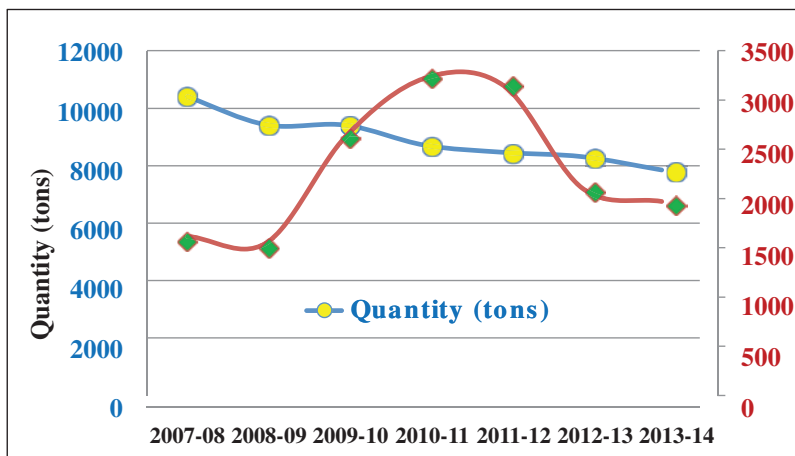


Figure 12. Pine resin production and its value in Himachal Pradesh and Uttarakhand

Pine resin processing in India

Himachal Pradesh State Forest Development Corporation Limited an Undertaking of the Himachal Pradesh government came into existence on 25th of March 1974. This Corporation deals mainly with marketing of timber, fuel wood, pulpwood, bamboo, *khair* and resin. The entire government resin tapping work is being done by the Corporation, through modern techniques (Rill method as of now). It is graded and sold on the basis of colour, the palest shades of yellow-brown being the better quality. Quality criteria and specifications are described in Table 14.

The two Resin & Turpentine Oil Factories, located at Bilaspur and Nahan operational since four decades, have both skilled and unskilled workers to undertake resin processing and other diversification activities. Rosin and turpentine oil and other subsidiary products like phenyl, varnish, black japan *etc.* are produced from the collected resin. Rosin is the major product obtained from pine resin. It remains behind as the residue after distillation of the turpentine oil. It is a brittle, transparent, glassy solid. It is insoluble in water but soluble in many organic solvents.

Table 14. Quality criteria for different grades of the rosin

Sl. No.	Rosin	Grade	Full Name
1.	Pale	X	Extra White
		WW	Water White
		WG	Window Glass
		N	Nancy
2.	Medium	M	Mary
		K	Kitty
		H	Harry
3.	Dark	D	Dark
		B	Black

Pine resin market and price

In any analysis of world production and trade in gum naval stores, the volume of trade taking place in crude resin needs to be estimated. Until recently, this did not need to be considered as all resin was processed at origin and rosin and turpentine were the primary products of trade. However, trade in crude resin has developed over years as the capacity for tapping has fallen in some of the traditional producing countries, notably Portugal and India. These countries have excess processing capacity which can be brought back into production if an economic, external source of crude resin is found.

The absence of capital costs therefore enables the processors of imported resin to sell the outputs (gum rosin and turpentine) at a price which only need cover raw material and processing costs, freight, drums and profit. The sale of crude resin also allows producing countries with a surplus to earn extra revenue without investing in additional capacity for processing. Price of turpentine oil (vegetable) per litre (naked) ex-factory on cash basis ranged from ₹ 87 to ₹ 89. The price of per kg rosin is given in Table 15. This price is an ex-factory price including packing charges excluding taxes and duties *etc.*

Table 15. Grade-wise price of rosin during 2013-14

Sl. No.	Grade	Full Name	Rate (₹/Kg) @	Rate (₹/Kg) #
1.	X	Extra White	121.00	122.50
2.	WW	Water White	119.00	120.50
3.	WG	Window Glass	117.00	118.50
4.	N	Nancy	116.00	117.50
5.	M	Mary	115.00	116.50
6.	K	Kitty	114.00	115.50
7.	H	Harry	113.00	114.50
8.	D	Dark	110.00	114.50
9.	B	Black	93.00	94.50

@Packing in TP Barrels #Packing in PGI Barrels

International trade of pine resin

The total export of pine resin during the year 2013-14 was 192.1 tons which was valued ₹ 262.8 lakh. Details of export in quantity and value, list countries importing resin from India and details of resin supply from various countries during previous years has been presented in the Table- 16. Demand of resin was higher than the quantity processed in India. Hence, India depends on China, Indonesia, Vietnam and Nepal to meet its domestic demand. About 98 per cent gum rosin was supplied from these four neighboring countries of Asia and rest of this came from Europe and America. EXIM data gum rosin was collected from Director General of Commercial Intelligence and Statistics, Government of India, Kolkata.

Rosin is an important natural resin in the basket of import items. During last 10 years exported value showed that 3.75 per cent contribution in natural resins export were from Gum rosin. The average annual export quantity of rosin was 542.78 tons valued ₹ 343.62 lakh during the period 1998-99 to 2012-13. However, during last 15 years growth rates in exported quantity as well as value were estimated as negative and these were calculated about 25 per cent and 21 per cent, respectively. Similarly, the average annual import quantity of rosin was 22292.71 tons worth ₹ 12454.34 lakh during the period 1998-99 to 2012-13. Its import had a very high stability with growth rates in import quantity (10.65 %) as well as value (26.41 %).

Table 16. EXIM scenario of rosin during 2013-14

Sl. No.	Country	Quantity (tons)	Value (₹ lakh)	Value (000 US dollars)	% Share
A.	Export				
1.	Cote D' Ivoire	87.0	128.1	213.5	49.28
2.	Nigeria	52.0	70.4	113.5	26.20
3.	Kenya	16.7	29.7	47.5	10.95
4.	Nepal	19.6	17.6	28.4	6.54
5.	Tanzania Rep	10.6	10.8	19.6	4.53
6.	UAE	4.9	5.3	9.1	2.09
7.	Mauritius	1.0	0.5	0.9	0.21
8.	Congo D. Rep.	0.2	0.3	0.4	0.10
9.	Burundi	0.1	0.1	0.1	0.03
10.	Uganda	0.1	0.1	0.1	0.03
11.	Malawi	0.1	0.1	0.1	0.02
	Total	192.1	262.8	433.2	100.00
B.	Import				
1.	China P Rp	13429.3	16846.2	27934.6	44.85
2.	Indonesia	10852.5	10386.3	17170.8	27.57
3.	Vietnam Soc Rep	5538.2	5534.2	9274.1	14.89
4.	Nepal	6268.8	3953.5	6559.0	10.53
5.	USA	572.6	448.3	750.0	1.20
6.	Japan	80.0	192.3	311.4	0.50
7.	Germany	37.3	77.8	129.9	0.21
8.	Mexico	42.8	37.3	60.5	0.10
9.	Belgium	11.3	28.2	45.0	0.07
10.	Brazil	16.0	23.3	36.8	0.06
11.	Malaysia	9.3	3.7	6.8	0.01
12.	France	0.3	2.3	3.8	0.01
13.	UK	1.0	0.7	1.3	0.00
14.	Portugal	0.0	0.1	0.1	0.00
	Total	36859.4	37534.3	62284.3	100.00

Plant exudate based natural gums

The annual production of gum varies much from year to year. The data and information have been collected from Girijan Co-operative Corporation Limited, Visakhapatnam, Andhra Pradesh, Chhattisgarh M.F.P. (T&D) Fed. Ltd., Raipur, Chhattisgarh, Gujarat State Forest Development Corporation Limited (GSFDCL), Vadodara. The gum tapping is mainly done in the schedule areas where tribal populations exist. The collection charges to the collectors at collection centres are paid by the purchaser at the



Figure 13. Babool tree (*A. nilotica*): Source of babool gum

rate fixed by the Govt. After making the payment of the collection charges to the collectors and the difference amount of sale rate and collection rate in the District Union, the purchasers are allowed to transport the collected gums wherever they desire. Four major gums namely *karaya* gum (*S. urens*), *dhawada* gum (*A. latifolia*), *babool* gum (*A. indica*) and *khair* gum (*A. catechu*) are categorized under nationalized gums in the state. In India, mainly *karaya* gum (*S. urens*), *dhawada* gum (*A. latifolia*), *salai* gum (*B. serrata*), *prosopis* gum (*P. juliflora*), *khair* gum (*Acacia catechu*), *babool/babul* gum (*A. Arabica/nilotica*), *Jhingan* (*Lannea coromandeliga*), *palas* (*Butea monosperma*), *char* (*B. lanzan* Spreng) and *guggul* gum (*C. wightii/mukul*) are produced. The state wise gum production during 2008-09 to 2013-14 is shown in Table 17. About 85 per cent of gum production in the country is contributed by Madhya Pradesh (20.2 %), Andhra Pradesh (17.8 %), Chhattisgarh (17.2 %), Jharkhand (16.3 %) and Maharashtra (13.6 %). Rest of the 15 per cent comes from Gujarat (4.5 %) and other minor gum producing states (10.5). District wise gum producing areas in the country are presented in Table-33.

Table 17. Gum production in major gum producing states of India (in tons)

Sl. No.	State /Year	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Average
1.	Andhra Pradesh	261.0	210.3	122.4	190.1	127.0	11.8	153.8
2.	Chhattisgarh	142.4	236.9	171.5	65.5	90.4	182.5	148.2
3.	Gujarat	28.0	47.2	27.9	33.6	42.6	54.7	39.0
4.	Jharkhand	NA	NA	240.6	270.4	207.3	126.0	140.7
5.	Madhya Pradesh	21.9	8.7	286.5	292.3	232.4	207.5	174.9
6.	Maharashtra	NA	NA	200.0	203.4	165.3	134.9	117.3
7.	Others	5.0	6.4	103.0	134.6	155.2	143.0	91.2
	Total	458.3	509.6	1151.8	1189.9	1020.3	860.4	865.0

Plant Exudate: Gum karaya (*S. urens*)

Vernacular names:-Kullu, Kadaya, Kadu, Genduli, Tapsi, Panerukh, Kandol, Salad

Gum karaya is the dry exudate of *S. urens* and *S. villosa*. It is collected from *S. urceolata* and *S. foetida* in Indonesia, *S. setigera* in Africa and from *S. caudata* in Australia (Gautami and Bhat 1992). It is also known by the name Indian tragacanth, as it resembles gum tragacanth produced by *Astragalus spp.* Gum karaya is one of the least soluble gums used for many industries as given below:-

- i. Pharmaceutical, food, paper, textiles, cosmetic industry
- ii. Superior grades in ice-creams
- iii. Inks, rubber, linoleum, oil clothes, paper coatings, polishes, lower grades in varnishes, etc,
- iv. Engraving processes and in oil drilling operations
- v. In dental compounds and colostomy rings.
- vi. Acting as mucilage it is also used as a bulk laxative
- vii. As a binder, emulsifier and stabilizer in food industry.

Karaya gum production in India

Overall yield has decreased from 6838 tons in 1975–1976 to 258.2 tons in 2013–14. During this period the price increased from ₹ 7.4/kg to ₹ 110/kg. The gum production across various states has been presented in Table 18 and Figure 14. The gum producing forest divisions in the Chhattisgarh are Bilaspur (Mugeli, Dindori,

Ratanpur, Takhatpur, Lormi), Raipur, E. Surguja (Balarampur), Marvahi (Kota), S. Surguja, Raigarh (Khamariya), Dharmajaygarh, Rajnandgaon, Mahasamund, Dhamtari, Korea, Sukma, Bijapur, Dantewada and W. Bhanupratapur. In Jharkhand, the karaya gum is produced in the Latehar (Garu, Mahuadar, Herhanj, Balumath, Barwadih, Lesliganj, Chhipadohar and Richughutu), Chatra (Lawalang, Pratappur and Kanti), Garhwa (Ramkanda and Bhandaria), Daltonganj (Panki and Chhatarpur) and West Singhbhum (Chakradharpur). Annual average production of karaya gum during last six years in India is illustrated in Figure 15.

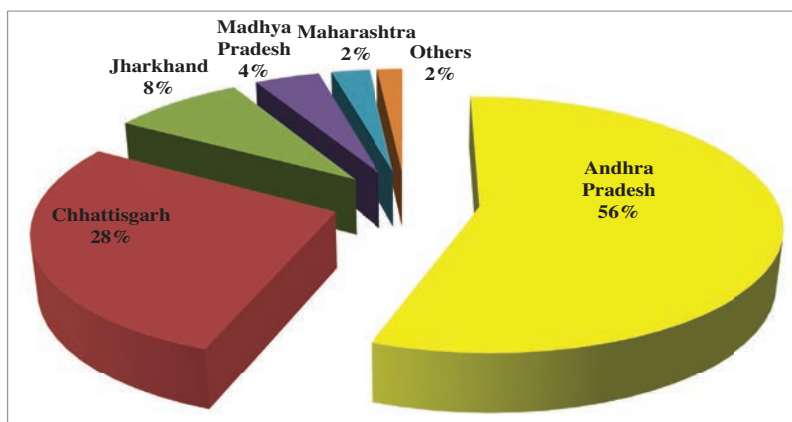


Figure 14. State-wise average production of karaya gum

Table 18. Karaya gum production in major gum producing states of India (in tons)

Sl. No.	State /Year	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
1.	Andhra Pradesh	237.6	196.5	115.1	182.1	117.9	92.3
2.	Chhattisgarh	86.4	175.0	76.0	14.5	19.9	100.0
3.	Gujarat	0.1	0.1	0.1	0.2	0.2	0.1
4.	Jharkhand	NA	NA	NA	49.4	51.5	40.4
5.	Madhya Pradesh	21.9	8.7	6.5	12.2	8.2	12.1
6.	Maharashtra	NA	NA	NA	23.2	9.7	8.3
7.	Others	5.0	6.4	3.0	4.0	5.0	5.0
	Total	351.0	386.8	200.6	285.6	212.5	258.2

Collection and grading of *karaya* gum

The collection rate for *karaya* gum ranged from ₹ 22,000/-, ₹ 17,000/- and ₹ 12,000/- per quintal for grade I, II and III, respectively. Overall price of the *karaya* gum was observed ₹ 11000/- per quintal during 2013-14. The collection of *Kullu* gum is prohibited in the state of Chhattisgarh except in Bastar, Kanker and Jagdalpur districts. The entire area of collection is divided into different units. These units are sold in advance through tenders and auctions by state Minor Forest Produce Federations to facilitate the collection of gums. The purchaser is required to deposit the 10 per cent of the sale value, calculated on the basis of notified quantity in the tender notice, as security deposit. During 2011-12 to 2013-14, average price of gum collection across various states and at country level is given in Table 19 and Figure 16.

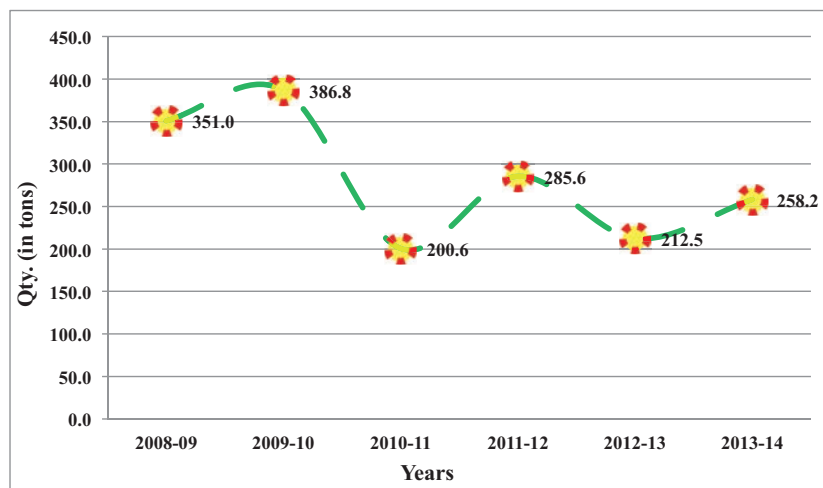


Figure 15. *Karaya* gum production in India

Table 19. *Karaya* gum collection price (₹/kg)

Sl. No.	Year	2011-12	2012-13	2013-14*
1.	Jharkhand	45	50	120
2.	Madhya Pradesh	120	125	120
3.	Maharashtra	45	45	120

* Minimum support price was declared by Pricing Cell, TRIFED, Ministry of Tribal Affairs, Govt. of India

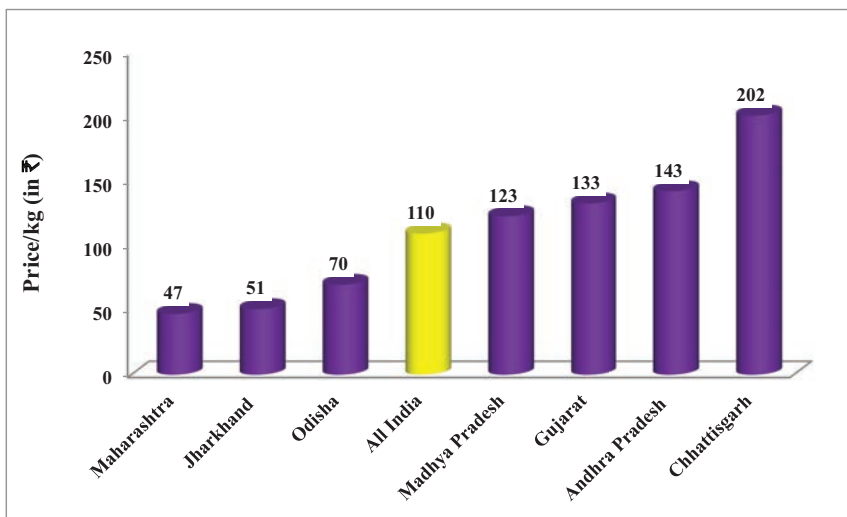


Figure 16. Average price of gum *karaya* across the country

International trade of *karaya* gum

There is high demand of export of gum *karaya* from India. France (34.4 %), Japan (29.0 %), United State (10.0 %), U.A.E. (8.0 %) and Pakistan (3.0 %) remained as major export destinations during 2013-14 and about 86 per cent *karaya* gum supplied to these top five destinations. Switzerland, Malaysia, Germany, Taiwan, etc. were the other destinations. During 2013-14, *karaya* gum was exported across the globe in 24 countries. Ghana and Mali has supplied 72 per cent raw *karaya* gum and about 28 per cent supply of good quality *karaya* gum was from USA. Destination wise export share is depicted in Table 20.

Table 20. Export and import of *karaya* gum during 2013-14

Sl. No.	Country	Quantity (tons)	Value (₹ lakh)	Value (000' US dollars)	% share
A.	Import				
1	Ghana	358	166.6	280.6	53.7
2	U S A	6.6	86.8	145.6	27.8
3	Mali	57.2	54.7	96.6	18.5
	Total	421.8	308.1	522.8	100.0

Sl. No.	Country	Quantity (tons)	Value (₹ lakh)	Value (000' US dollars)	% share
B.	Export				
1	France	235.0	692.5	1170.0	34.4
2	Japan	94.9	595.8	991.8	29.2
3	U S A	61.8	204.8	340.6	10.0
4	U A E	27.5	165.9	272.3	8.0
5	Pakistan IR	26.8	63.7	102.7	3.0
6	Switzerland	23.0	60.6	99.8	2.9
7	Malaysia	15.0	59.0	102.8	3.0
8	Germany	10.0	48.2	79.2	2.3
9	Taiwan	3.5	29.4	47.7	1.4
10	Others	19.5	119.0	189.9	5.6
	Total	517.1	2038.9	3396.8	100.0

Plant Exudate: *Dhawda gum /gum thiruman (A. latifolia)*

Vernacular names: - Gum Ghatti, Dhauada, Dhaura, Bakli, Tirman, Vekkali, Dhanda, Damado

Dhawda gum is the dry exudate of *A. latifolia*. It has a glassy fracture and occurs in rounded tears which are normally less than 1 cm in diameter. It often occurs in larger vermiform masses. The colour of the exudate varies from light to dark brown; the lighter the colour the better the quality. *Dhawda gum* is used for many industries. It is used as an emulsifier and stabilizer in beverages and butter containing table syrups; flavour fixative for specific applications; to prepare powdered, stable, oil-soluble vitamins; as a binder in long-fibered light weight papers; as an emulsifier of petroleum and non petroleum waxes to form liquid and wax paste emulsions; to prepare uniform and discrete prills of cross-linked polystyrene; used as drilling mud conditioner and the acidizing of oil wells and also used in powdered explosives to improve resistance to water damage.

Dhawda gum production in India

Dhawda gum is produced in the states of Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra and Andhra Pradesh. Total production was about 193.5 tons in 2013-14 which is lower than that of previous year (232.7 tons). State-wise production data are shown in Table 21.

Table 21. Dhawda gum production in major gum producing states of India (in tons)

Sl. No.	State /Year	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
1.	Andhra Pradesh	0.6	0.3	0.8	0.5	0.6	0.8
2.	Chhattisgarh	39.3	42.5	50.2	30.1	40.6	45.2
3.	Gujarat	0.2	0.5	0.3	2.3	1.3	1.4
4.	Jharkhand	NA	NA	NA	20.5	30.2	25.4
5.	Madhya Pradesh	NA	NA	NA	30.1	24.2	20.8
6.	Maharashtra	NA	NA	NA	40.2	55.6	34.2
7.	Others	NA	NA	NA	50.6	80.2	65.7
	Total	40.1	43.3	51.3	174.3	232.7	193.5

Collection and grading of dhawda gum

The collection rate for *dhawada* gum for the year 2011-12 to 2013-14 is shown in Table 22. In Madhya Pradesh the rates for collection of *dhawda* gum was highest relatively to Jharkhand, Maharashtra and Chhattisgarh.

Table 22. Dhawda gum collection price (₹/kg) in major gum producing states

Sl. No.	Year	2011-12	2012-13	2013-14
1.	Chhattisgarh	50.0	50.0	60.0
2.	Jharkhand	45.0	50.0	50.0
3.	Madhya Pradesh	140.0	150.0	160.0
4.	Maharashtra	45.0	45.0	50.0

Plant Exudate: Other gums

The other important gums of the state are *saja* (*Terminalia tomentosa*), *dikamali* (*Gardenia gummifera*), *bahera* (*Terminalia bellirica*), *Jhingan* (*L. coromandeliga*), *babool* (*A. nilotica*), *palas* (*B. monosperma*), *salai gum* (*B. serrata*), *khair* (*A. catechu*) and *char* (*B. lanzan* Spreng).

Table 23. Production of other gums in India

Sl. No.	State /Year	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
1.	Andhra Pradesh	22.8	13.5	6.5	7.5	8.5	11.0
2.	Chhattisgarh	16.7	19.4	45.3	20.9	29.9	37.3
3.	Gujarat	27.7	46.6	27.5	31.0	41.1	53.2
4.	Jharkhand	NA	NA	240.6	200.5	125.6	60.2
5.	Madhya Pradesh	NA	NA	280.0	250.0	200.0	174.6
6.	Maharashtra	NA	NA	200.0	140.0	100.0	92.4
7.	Others	NA	NA	100.0	80.0	70.0	72.3
	Total	67.2	79.5	899.9	729.9	575.1	501.0

The total production of other gums across various states was around 501.0 tons during 2013-2014 (Table 23). The collection rate of *jhingan*, *khair* and *babool* gum ranged from ₹ 1750 to 4000/qt.

Collection price and grading

Retail packing price of the *guggul* gum, *babul* gum (*A. arabica*) and *salai dhoop* in Gujarat was observed as ₹ 1000/kg ; ₹ 170/kg and ₹ 250/kg, respectively. Extraction of these gums was carried out through Primary Forest Produce Cooperative Societies and the District Unions. The collected quantity is sold through open tenders/auctions either in advance or after godowning. However, all gums except *karaya* gum have been taken out of the list of specified produce in 2003. In Madhya Pradesh, these trees were being destroyed due to deep tapping. Therefore, the State Government had banned extraction of gums in early 80's. This ban was lifted in 1995 and controlled extraction was permitted in Sheopurkalan, Khandwa and Bastar Districts. *Salai* gum was notified in Madhya Pradesh state as "specified forest produce" under the M.P *Van Upaj (Vyapar Viniyaman)* Act, 1969 and only the State Government or an agent appointed by the State Government could collect these gums. It has been taken out of the list of specified produce in June 2003. In 1997, the State Government lifted the ban on extraction of *salai* gum in Gwalior, Shivpuri, Ujjain and Khandwa forest circles. It was also permitted in Narmada Sarovar submergence areas of Badwani and Jhabua forest Divisions. *Karaya*, *dhawada*, *khair*, *babul*, *salai* gums were notified in Madhya Pradesh state as "specified forest produce" under the M.P *Van Upaj (Vyapar Viniyaman)* Act, 1969

and only the State Government or an agent appointed by the State Government could collect these gums. *Dhawada*, *babul* and *khair* gums are grouped together as Class-II gums to distinguish them from *karaya* and *salai* gums. These gums have been taken out of the list of specified produce in June 2003.

Regulations and governance

On the basis of regulations and governance issues for trading of NTFPs including natural resins and gums, the Government has classified into following three categories.

- i. Nationalized items
- ii. Monopoly items
- iii. Non-nationalized items

State Government classifies NTFPs as nationalized items, which can only be traded / marketed by Forest Department. The NTFPs included under nationalized items may vary from state to state. A trade wing of the Forest Department's trade division deals with its marketing. The forest Department gives the monopoly rights for value added processes and marketing of NTFPs to some agency under lease agreement, based on sustainable harvesting and economic value. Apart from nationalized and monopoly items, remaining NTFPs are open to all. Primary collectors or their associations must get permits from the Divisional Forest Officer (DFO) to transport and market the produce. The state-wise list of gums producing trees and respective categories has been presented in Table 34.

Seed based natural gum-guar gum

India is native of *guar* or cluster bean. It has been used as vegetable by households, as cattle food (whole green plant), as cattle feed (*churi* and *korma*) in animal husbandry and as a green manure crop in agriculture. *Guar* gum comes from the endosperm (30 %) of the seed of the legume plant *Cyamopsis tetragonoloba*; an annual plant, grown in dry regions of India. There are various grades of *guar* gums pure or derivative. *Guar* gum is a white to creamy coloured, free flowing powder without any extraneous matter. Its ability to suspend solids, bind water by hydrogen bonding, control the viscosity of aqueous solutions, form strong tough films have accounted for its rapid growth. The growing season of *guar* is 14 to 16 weeks and requires reasonably warm weather and moderate flashing rainfall with plenty of sunshine. Too much rain can cause the plant to become more 'leafy'

resulting thereby reducing the number of pods or the number of seeds per pod which affects the size and yield of seeds. The crop is generally sown after the monsoon rainfall in the second half of July to early August and is harvested in late October to early November. The *guar* is a naturally rain fed crop. Depending on the monsoon rainfall the total size of *guar* crop varies from year to year. After harvesting, when the pods become dry through sunlight, they are beaten off and during this process, the seeds come out of the pods. Peak arrival of the crop in the market is seen in October to December while lean arrival in the months January to May.



Figure 17. *Guar* plant (*C. tetragonoloba*) with pods

Guar seed production in India

India contributes about 80 per cent to the world *guar* production and Pakistan is the second largest producer. The all India area, production and yield of *guar* seed has been presented in Table-24. State wise area, production and yield of *guar* seed has been presented in Table-25. In Rajasthan, *guar* crop is grown after the first shower of *monsoon* in July to early August and is harvested in late October early November. It grown as the rain fed crop and its production is totally depends on the performance of *monsoon* and this fact can be confirmed from the decline in production due to deficient rainfall during 2009-10. The price hit all time high in the spot and futures market during this period.

Table 24. All India area, production and yield of guar seed and potential of guar gum production

(Area- thousand ha, Production- thousand tons, Yield- kg/ha,)

Sl. No.	Year	Area	Production	Yield	Potential of guar gum production
1.	2007-08	3472.6	1788.5	515	596.2
2.	2008-09	3862.5	1935.8	501	645.3
3.	2009-10	2995.2	594.7	199	198.2
4.	2010-11	3382.2	1965.3	581	655.1
5.	2011-12	3444.2	2217.6	644	739.2
6.	2012-13	5151.7	2460.7	478	820.2
7.	2013-14	5887.7	3388.4	576	1129.5

Source: Directorate of Economics and Statistics, MoA, GoI,
<http://rsamb.rajasthan.gov.in/amb/1/mandiselect.asp>

Table 25. State wise area, production and yield of guar seed during previous seven years

Sl. No.	State	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Average
A.	State wise area of guar seed during previous seven years (thousand ha)								
1.	Gujarat	196.0	150.4	132.7	124.6	170.0	477.5	308.1	222.8
2.	Haryana	340.0	370.0	252.0	256.0	215.0	388.0	481.0	328.92
3.	Punjab	23.9	27.8	21.8	24.0	25.0	26.0	26.0	4.9
4.	Rajasthan	2909.7	3318.1	2586.8	2981.0	3095.9	4526.4	5070.1	3498.3
5.	Uttar Pradesh	2.4	2.5	2.5	2.4	2.5	2.5	2.5	2.5
	All India	3472.6	3862.5	2995.2	3382.2	3444.2	5151.7	5887.7	4028.0
B.	State wise production of guar seed during previous seven years (thousand MT)								
1.	Gujarat	130.0	52.7	44.7	73.0	100.0	113.6	133.6	92.5
2.	Haryana	395.0	602.0	329.0	333.0	290.0	278.0	369.0	370.9
3.	Punjab	17.8	22.1	16.8	18.0	20.0	22.0	22.0	19.8
4.	Rajasthan	1243.7	1261.0	201.0	1540.5	1847.7	2023.1	2861.8	1568.4
5.	Uttar Pradesh	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0
	All India	1788.5	1935.8	594.7	1965.3	2217.6	2460.7	3388.4	2050.1

Sl. No.	State	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Average
C.	State wise yield of <i>guar</i> seed during previous seven years (Kg/ hectare)								
1.	Gujarat	663	350	337	586	588	238	434	457
2.	Haryana	1162	1627	1306	1301	1349	716	767	1175
3.	Punjab	745	795	771	750	800	846	846	793
4.	Rajasthan	427	380	78	517	597	447	564	430
5.	Uttar Pradesh	839	840	835	832	800	800	800	821
	All India	515	501	199	581	644	478	576	499

Source: Directorate of Economics and Statistics, MoA, GoI

Rajasthan has been a leading state in production as well as processing of *guar* seed in India followed by Haryana and Gujarat. In Rajasthan, the districts where *guar* production is done are Churu, Bikaner, Jaisalmer, Barmer, Nagaur, Hanuman Garh, Jodhpur, Ganganagar, Jaipur, Sirohi, Dausa, Jhunjhunu and Sikar. The districts in Haryana indulged in the production of *guar* are Bhiwani, Gurgaon, Mahendragrh and Rewari and the districts in Gujarat are Kutch, Banaskantha, Mehsana, Sabarkantha, Vadodara and Ahmedabad. Cultivation of *guar* crop has been started in newer areas like Andhra Pradesh including Telengana and other southern states also.

Guar seed processing and value addition in India

India is leading in *guar* gum production due to its well established *guar* gum industry in Jodhpur, Rajasthan. Other states like Gujarat, Haryana and Maharashtra has *guar* seed collection centers and *guar* gum processing units. Recently, more units are also being established in Bikaner, Rajasthan with high capacity. Ganga Nagar, Hissar, Alwar, Sirsa, Jodhpur, Bikaner, Jaipur are the major markets for *guar* seed. Major *guar* gum is used in paper, textile, oil drilling, mining, explosives, ore flotation and other various industrial applications. Out of the total production of around 6.5 lakh tons of *guar* gum in the country, around 50,000 tons is consumed in the domestic market and around 6.0 lakh tons exported.

During processing, modifications in *guar* gum are intended to impart desired chemical properties in the galactomannan like increased solubility in water, clarity of solution, increased shelf life, ionic character according to the needs of the particular final application. By these modifications lot of opportunities are opened, where chemically modified *guar* derivatives can be used (Table 26).

Table 26. Various varieties of processed products of *guar* gum for industrial applications

Sl. No.	Varieties	Applications
1.	Hydroxy alkylated <i>guar</i> gum	Oil well drilling
2.	Carboxy methylated <i>guar</i> gum	Textile printing, tobacco industry, water based paints
3.	Oxidised <i>guar</i> gum	Paper industry, food, textile printing applications
4.	Acetates of <i>guar</i> gum	Food-human and animal
5.	Cationic derivatives of <i>guar</i> gum	cosmetic and paper industries
6.	Sulphated <i>guar</i> gum	Mining
7.	<i>Guar</i> gum formate	Food-human and animal, miscellaneous
8.	<i>Guar</i> gum acryl amide	Pharmaceutical industry
9.	Borate cross linked <i>guar</i> gum	Photography, oil well drilling, carpet printing
10.	Reticulated <i>guar</i> gum	Stick explosives, blasting slurries

Movement in price of *guar* gum

The seasonal demand for *guar* gum is at its peak during the months of Nov-March around the world. As the reason being quite simple, the majority of the drilling activities of crude oils take place during these months. Going forward we expect

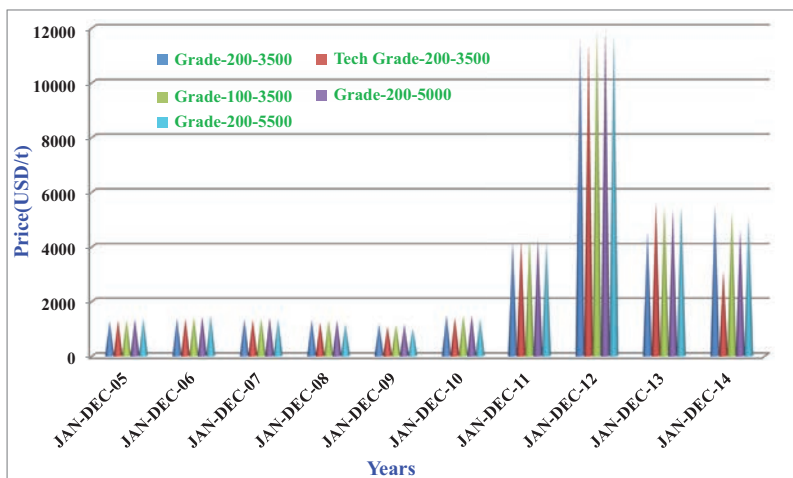


Figure 18. International price level of different grades of *guar* gum

guar seed and *guar* gum prices to stable further due to normal carry forward stocks, good export demand and seasonal demand for *guar* gum. We expect stable *guar* seed prices in next 4-5 months in domestic market and the international price scenario of different grades of *guar* gum during 2005-06 to 2013-14 is shown in Figure 18.

International trade of *guar* gum

India's top agricultural export commodities in terms of quantity and value for three years are given in the Table-27. Agricultural exports increased from ₹ 860.2 billions in 2011-12 to ₹ 1349.4 billions in 2013-14 registering a growth of nearly 57 per cent. Increase in value of agricultural exports during 2012-13 was primarily on account of higher exports of *guar* gum, basmati & non-basmati rice, meat & meat preparations. *Guar* gum has been the topmost export commodity in agri-export during previous two years (2011-12 and 2012-13), but in 2013-14 it ranked on 4th position after *basmati* & non-*basmati* rice, and buffalo meat.

Table-27: Top agri-export commodities during previous two years

Sl. No.	Particulars	Export Value (₹ in billions)			% share in total agri- export		
		2011-12	2012-13	2013-14	2011-12	2012-13	2013-14
1.	<i>Guar</i> gum	165.2	196.2	117.3	19.2	18.2	8.7
2.	<i>Basmati</i> rice	154.5	168.6	293.0	18.0	15.7	21.7
3.	Buffalo meat	137.3	156.6	272.5	16.0	14.6	20.2
4.	Non- <i>basmati</i> rice	86.6	130.9	174.9	10.1	12.2	13.0
5.	Other cereals	54.9	-	71.3	6.4	-	5.3
6.	Wheat	-	91.9	92.6	-	8.5	6.9
	Total (S.No.1-6)	598.5	744.3	1021.6	69.6	69.2	75.7
	Total agri-export (All items)	860.2	1076.4	1349.4	100.0	100.0	100.0

Source: DGCIS & APEDA Annual Report.

Export of *guar* gum during X and XI plan period, export and production capacity during 2002-03 to 2013-14 is given in Table 28 and Figure 19. India is the major exporter of *guar* gum to the world. It exports various forms of *guar* products to a large number of countries. The country has exported 6, 01,945.42 MT of *guar* gum

to the world for the worth of ₹ 11,734.52 crores during the year 2013-14. India is also the leading net exporter of *guar* seeds. The country exports over 6.01 lakh tons of *guar* and its derivatives, which is comprised by 83,000 tons of refined split *guar* gum(13.7 %), 3.87 lakh tons of treated and pulverized *guar* gum(64.3 %), 1.32 lakh tons of *guar* meal (21.9 %)and 1.53 tons of *guar* seed (0.0003 %).

Table 28. Export of *guar* gum during X and XI plan period

Sl. No.	Year	Quantity (in MT)	Quantity (in '000 MT)	Value (in ₹ lakh)	Value (in US million dollar)
1.	2007-08	123675.3	123.68	61,126.35	151.75*
2.	2008-09	257810.3	257.81	133406.57	286.52*
3.	2009-10	217938.29	217.94	113013.56	236.92*
4.	2010-11	440659.6	440.66	293198.85	638.88*
5.	2011-12	707326.44	707.33	1652386.68	3,446.36
6.	2012-13	406149.9	406.15	2128130.52	3,919.18
7.	2013-14	601945.42	601.95	1173452.5	1,979.56

Source: Directorate of Economics and Statistics, MoA, GoI, *Yearly average exchange rates (ask) for corresponding time horizon has been used for calculation

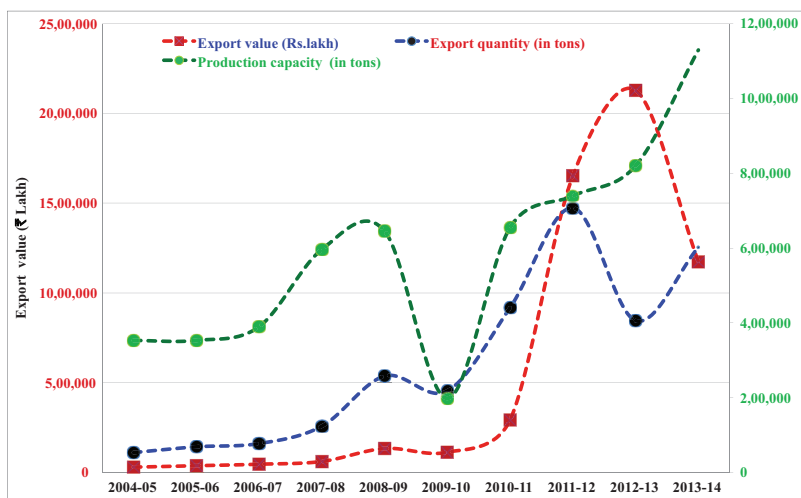


Figure 19. Trends in production potential and export of *guar* gum from India

United States, China, Italy, Germany, Malaysia, Russia and Turkey remained as major export destinations as previous year. Egypt, Indonesia, Latvia, Canada, Greece, Sri Lanka and Taiwan were the new entrants in top export destinations during 2013-14. During 2013-14, *guar* gum was exported across the globe to 106 countries. About 90 per cent was exported to top 14 countries and rest 10 per cent was exported to 91 countries around the world. Other countries are Poland, Korea, Netherland, Lithuania, U.K., Brazil, Philippines, Japan, Thailand, Argentina, U.A.E., Belgium, Australia, Switzerland, South Africa, Bulgaria, Mexico, Denmark, Ecuador, Iran, France, Cyprus, Chile, Bangladesh, Spain, Singapore, Vietnam, Saudi Arabia, Colombia, Nigeria, Pakistan, *etc.* Destination wise export share is depicted in Figure 20.

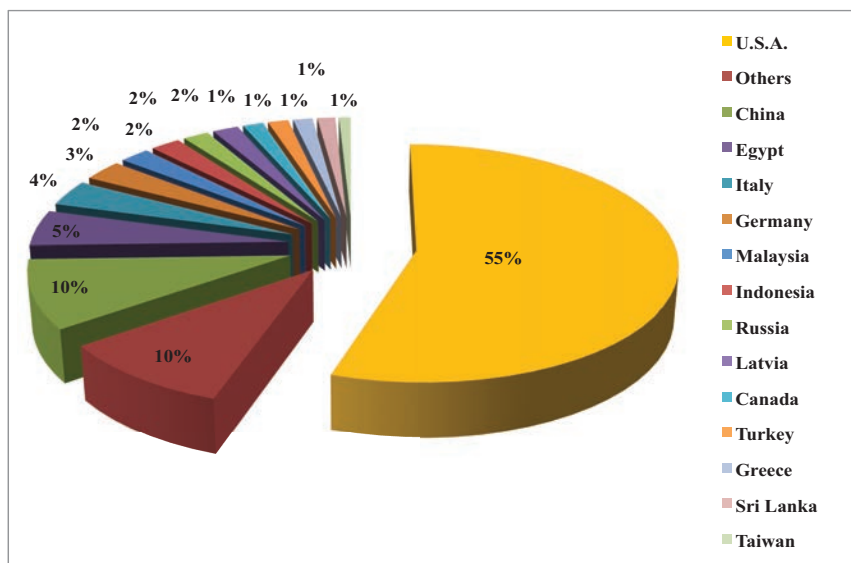


Figure 20. Destination-wise quantitative share of the *guar* gum exported from India

Natural Resins and Gums

NRG production level during 2013-14 was estimated to be comparatively higher (~1160314.1 tons) than previous year. Other resins and gum production have declined during the current year. Production and trade of NRGs including *guar* gum, lac, pine resin, *karaya* gum, *dhawda* gum and other natural resins and total production figure of all the NRGs is tabulated as under.

Table 29. Total NRG production (quantity in tons)

Sl. No.	Name of product	2009-10	2010-11	2011-12	2012-13	2013-14	Average	% share
1.	Guar gum*	195907.8	648959.5	745341.0	807541.7	1129478.3	705445.7	96.27
2.	Lac	16495.0	9035.0	17900.0	19577.0	21008.0	16803.0	2.29
3.	Pine resin	9460.8	8764.1	8514.2	8361.3	7900.0	8600.1	1.17
4.	Karaya gum	386.8	200.6	285.6	212.5	258.2	268.7	0.04
5.	Dhawda gum	43.3	51.3	174.3	232.7	193.5	139.0	0.02
6.	Other gums	79.5	899.9	729.9	575.1	501.0	557.1	0.08
7.	Other resins and gums	1567.0	430.3	691.1	1082.5	975.1	949.2	0.13
	Grand Total	223940.2	668340.7	773636.1	837582.8	1160314.1	732762.8	100.00

*Estimation of guar gum is based on the conversion of total guar seed production with a coefficient of conversion

Export and import of Natural Resins and Gums during 2013-14

Data on export and import of natural resins, gums & gum-resins were collected from Directorate General of Commercial Intelligence and Statistics, Kolkata. The total export of natural resins, gums and gum-resins during the year 2013-14 was 621246.6 tons valued ₹ 12722.8 crores and total import was 37981.6 tons valued ₹ 799.9 crores. A comparative increase in the volume of total NRG export was observed during 2013-14. But, due to deceleration in price, particularly for guar gum, the total value of NRG export was less than previous year 2012-13. On the other hand, a decline volume of import was observed during 2013-14 and acceleration in price was observed particularly for Asian gum and Myrrh. Consequently, the total value of NRG import was higher than previous year. Details of export and import of natural resins, gums and gum-resins is presented in the Table 30. Trend in export of natural resins and gums from India and import in India during last five years is presented in Figure 21 and Figure 22, respectively.

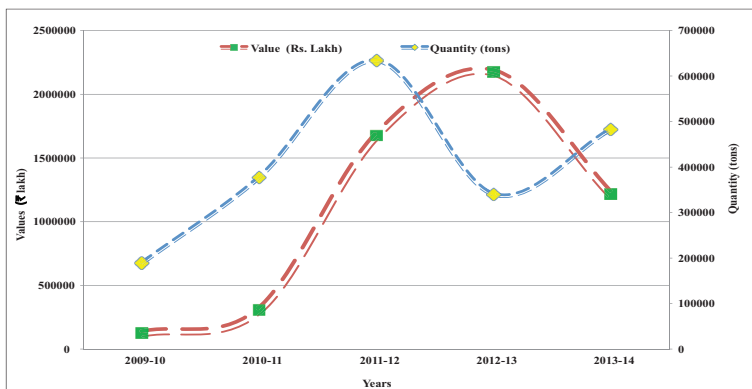


Figure 21. Trend in export of natural resins and gums from India during last five years

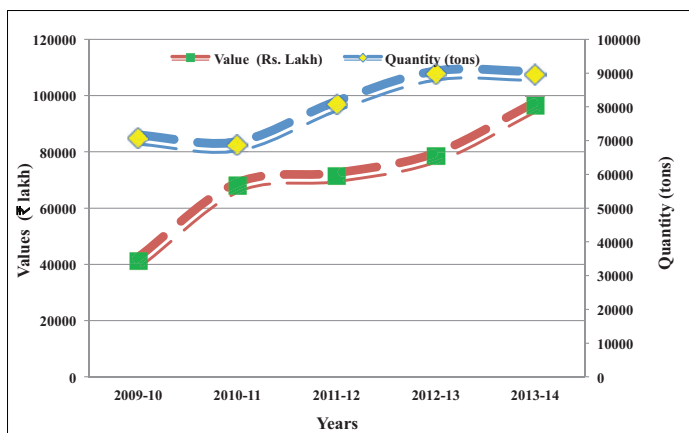


Figure 22. Trend in import of natural resins and gums in India during last five years

NRGs are important natural products in the export basket for foreign exchange reserve in India. The average annual export quantity of NRGs was 218971.29 tons valued ₹ 357155.57 lakh during the period 1998-99 to 2012-13. However, during last 15 years exported quantity has registered increasing trend with an annual compound growth rates of 10.69 per cent. Consequently, export value of NRGs has also shown increasing trend with an annual compound growth rates of 22.04 per cent. Similarly, the average annual import quantity of rosin was 50523.48 tons valued ₹ 29896.12 lakh during the period 1998-99 to 2012-13. Its import had a very high stability with growth rates in import quantity (13.64 %) as well as value (24.95 %).

Table-30:Export and import of natural resins, gums & gum-resins during 2013-14

Sl. No.	Name of product	Export		Import	
		Quantity (tons)	Value (₹ lakh)	Quantity (tons)	Value (₹ lakh)
A. Natural resins					
1.	Copal	0.06	0.50	2034.86	1042.22
2.	Dammar batu	2.08	5.07	14156.90	4521.26
3.	Gum rosin	192.14	262.81	36859.44	37534.29
4.	Lac	8158.10	56853.63	0.00	0.00
5.	Mastic gum	1.05	0.56	2.62	13.15
6.	Other resins	337.10	360.44	109.79	424.97
	Total	8690.52	57483.01	53163.60	43535.89
B. Gums					
1.	African gum	5.70	12.76	73.00	20.78
2.	Asian gum	683.40	4484.65	36.26	21.46
3.	Gum arabic	887.33	2281.64	33132.62	13378.41
4.	Guar gum refined split	82689.07	148408.78	164.18	1171.50
5.	Guar gum treated and pulverized	387161.62	996136.71	149.98	602.18
6.	Karaya gum (Indian tragacanth)	517.10	2038.93	421.78	308.07
7.	Tragacanth (Adracanth)	2.73	4.63	0.00	0.00
8.	Xanthum gum	9.17	51.49	364.84	582.07
9.	Other natural gums	1139.35	2073.60	234.08	623.21
	Total	473095.46	1155493.19	34576.74	16707.69
C. Gum resins					
1.	Asafoetida	983.45	3448.79	1147.11	35090.94
2.	Myrrh	0.60	4.92	58.40	180.13
3.	Olibanum or frankincence	120.90	195.80	10.60	25.79
4.	Other gum resins	169.92	429.49	579.47	961.21
	Total	1274.86	4079.00	1795.58	36258.06
	Grand Total	483060.85	1217055.20	89535.92	96501.64

Source: DGCIS, SHEFEXIL & APEDA Annual Reports.

POLICY INTERVENTIONS

The present practices adopted by different States for fixation of price for different MFPs were on the basis of market prices by reducing all the overheads and the second methodology for arriving at procurement price is to follow cost plus method in which cost of collection can be calculated for MFPs in different States. Therefore, government has taken the initiatives under the scheme for MFPs.

Mechanism for marketing of Minor Forest Produce through Minimum Support Price and development of Value Chain for MFP

A Pricing Cell was constituted pursuant to the Ministry of Tribal Affairs, Government of India and notified vide TRIFED's to recommend Minimum Support Price for Minor Forest Produce under the scheme "Mechanism for marketing of Minor Forest Produce through Minimum Support Price and development of Value Chain for MFP" To determination fair and remunerative MSP for lac and gum *karaya* the deliberations of the Pricing Cell with State Procurement Agencies (SPAs) and federations were conducted. Computation of cost of production of gum *karaya* and lac for MSP was furnished by ICAR-Indian Institute of Natural Resins & Gums (ICAR-IINRG). The Pricing Cell analysed the above information furnished by the SPAs and observed the wide variation in the data on the related parameters from State to State. Following decisions were made in the context of price stabilizing policy for MFPs.

A. Recommendations of Minimum Support Price of gum *karaya* for the 2014 crop

It was noted that major quantity of gum *karaya* is procured in Andhra Pradesh, Madhya Pradesh, Jharkhand, Chhattisgarh and Maharashtra. Gum *karaya* is procured from gum pickers in three grades and procurement prices are also announced grade wise. However, Gum *karaya* of grade III accounts for approximately 70 per cent of the total quantity purchased by GCC in Andhra Pradesh. Similar status was confirmed by other states regarding grade wise procurement. It was also noted that gum *karaya* is a nationalized item or is under monopoly system of procurement in most of the states except Gujarat, Jharkhand & Maharashtra. Despite announcement of procurement price in Gujarat hardly any quantity of gum *karaya* was procured. Similarly in Jharkhand and Maharashtra also, the quantity procured was very low. The Pricing Cell also considered the

computation of the cost of production of gum *karaya* as calculated and furnished by ICAR-IINRG, Ranchi. Representative explained the details of the cost worked out by for gum *karaya*, which is calculated on the basis of collection of gum *karya* in a scientific manner. The method used by them is to calculate the direct cost associated in collecting gum *karaya* independent of the minimum wage method. At the same time, members observed that IINRG, an institution engaged in research and training for NRGs, has calculated the cost that appears to be more reliable as they have arrived at this cost after studying various aspects of collection over a period. Finally, the Pricing Cell felt it appropriate to determine MSP on the basis of the cost of production as calculated by ICAR-IINRG plus 10 per cent increase thereon. Accordingly, the Pricing Cell recommended MSP of ₹ 108/- per kg. for gum *karaya* Grade-III for the current procurement season. However, the Pricing Cell underlined the need of initiating a study to collect relevant data to calculate cost of collection so that the MSP is fixed in pursuance of the spirit of the scheme. It requires field visits, primary data collection and hands-on work to study various factors affecting cost of collection for MFPS. However, this may take a long time as the survey can be conducted only during the harvesting season. The Pricing Cell recommended that a study be immediately initiated so that relevant data to calculate cost of collection for 12 MFPS in 8 States can be collected.

B. Recommendations of Minimum Support Price of lac for the 2014 crop

The two varieties of lac *rangeeni* variety (harvesting season is May-June & October-November) and *kusumi* variety (harvesting season is January-February & July-Aug) cultivated mainly by tribals. Its production is mainly dependent upon inoculation of broodlac by tribals on the lac host trees in time. Major quantity of lac is available in the State of Jharkhand followed by Chhattisgarh, M.P. & Odisha. Accordingly, based on the inputs provided by IINRG, Pricing Cell had recommended a Minimum Support Price (MSP) of ₹ 210 and ₹ 290/ kg for *rangeeni* and *kusumi* lac, respectively for 2014 crop (applicable up to November 2014 as the cost of the production may vary depending upon the cost of broodlac during the next season).

C. Recommendations of Minimum Support Price of lac for the 2015 crop

Normally the lac price is dominated by processors but farmers / primary collectors should get the price based on the cost of the production which may vary depending upon the cost of broodlac for the season. During the current year, the Lac Cultivators have used brood Lac of July 2014 crop in their cultivation when



the prices were ranging between ₹300-350/kg, hence cost of production of lac will be higher during harvesting season in December and January. IINRG submitted a detailed cost sheet for determining the cost of production for each variety of lac. The Pricing Cell recommended enhancing the current MSP by 10 per cent. Pricing Cell had recommended a Minimum Support Price (MSP) of ₹ 230 and ₹ 320/kg for *rangeeni* and *kusumi* lac, respectively for 2015 crop.

CONCLUSION

Value addition in lac based products has an encouraging market scenario as the export of Aleuritic acid is increasing since last two years. New and young entrepreneurs have entered in lac sector with big investments for production of high value products like Aleuritic acid and isoambrettolide. To meet the domestic demand Pine resin processing infrastructure is needed to be revamped. Both the units are functional at under capacity level. Production and procurement of some gums is declining during last two years. MSPs for NWFP may be key intervention for procurement, marketing and value chain establishment. It will be helpful to stabilize the price fluctuation particularly in case of lac. Copal, damar batu, mastic gum, gum rosin, lac and others are natural resins exported and imported in India. Gum arabic, asian gum, african gum, *karaya* gum, tragacanth, *guar* gum (refined split and treated pulverized), xanthum gum and others are natural gums exported and imported in India. Asafoetida, myrrh, oilbanum and others are gum-resins exported and imported in India. The average annual exported quantity of natural resins and gums during last 10 years was 1,49,652.96 tons valued ₹ 89,901.10 lakh while average annual imported quantity was 39,009.51 tons valued ₹ 15,682.70 lakh. The overall compound growth rate in natural resins and gums exported from India showed significant positive growth for quantity (7.85 % per annum) and for value (6.96 %) while in case of import it was significantly positive for imported quantity (20.77 %) and value (30.05 %). The instability index for exported natural resins and gums exported quantity and value was 11.55 and 23.80 respectively and it was lower than the instability index of imported quantity and value. The higher instability index of value might be due to change in international prices, nation and global production, trade and tariff policy.

Majority of natural resins were imported from Indonesia (44.6 % of total natural resins import), China (28.2 %) and Thailand (15.4 %), Majority of gums were imported from Nigeria (53.7 %), Sudan (13.9 %) and France (8.0 %) and majority of gum-resins were imported from Afghanistan (94.2 %), Iran (3.7 %) and Pakistan (0.6 %). The constraints related to export of natural resins and gums were small and scattered quantity of produce, fluctuation in domestic production and prices, adulteration in raw material, limited export promotional measures, improper international market information, lack of future trading and prior agreement as expressed by the exporter. India has a great potential in production and export of natural resins and gums because of availability of resins and gums yielding trees,



manpower, favorable climate and R&D support. The proper attention and action for intensification of effort for increasing natural resins and gums production will definitely improve the export earning of the country.

Table- 31: Sticklac lac production scenario in India during 2013-14 (in tons)

Sl. No.	Name of states / Districts	Name of lac crops				Total production
		<i>Baisakhi</i>	<i>Jethwi</i>	<i>Katki</i>	<i>Aghani</i>	
I.	Andhra Pradesh	40	2	70	1	113
II.	Assam	50	0	100	0	150
III.	Chhattisgarh					
1.	Bastar	20	50	15	60	145
2.	Bilaspur	100	25	50	65	240
3.	Dhamtari	35	35	20	20	110
4.	Durg	15	0	10	0	25
5.	Janjgir-Champa	50	30	20	30	130
6.	Kanker	45	300	70	320	735
7.	Korba	300	210	175	315	1000
8.	Mahasamund	50	20	80	6	156
9.	Raipur	20	80	10	95	205
10.	Rajnandgaon	90	25	50	25	190
11.	Surguja	80	0	55	0	135
12.	Ambikapur	0	10	15	0	25
13.	Raigarh	20	20	15	20	75
14.	Others	60	50	50	50	210
	TOTAL	885	855	635	1006	3381
IV.	Gujarat	10	30	2	5	47
V.	Jharkhand					
15.	Garhwa	25		40		65
16.	Gumla	50	1165	55	1110	2380
17.	Latehar	20	15	15	12	62
18.	Palamau	100		250	25	375
19.	Ranchi	300	2225	250	700	3475
20.	Khunti	300	1000	150	340	1790
21.	Simdega	60	1300	85	1000	2445
22.	West Singhbhum	180	425	55	325	985
23.	Others	200	150	180	100	630
	TOTAL	1235	6280	1080	3612	12207
VI.	Madhya Pradesh					
24.	Annappur & Shahdol	5	2	2	1	10

Sl. No.	Name of states / Districts	Name of lac crops				Total production
		Baisakhi	Jethwi	Katki	Aghani	
25.	Balaghat	700	5	180	5	890
26.	Chhindwada	15	6	7	8	36
27.	Dindori	45	8	7	5	65
28.	Hosangabad	15	8	5	5	33
29.	Mandla	50	2	40	15	107
30.	Narshinghpur	10	2	2	2	16
31.	Seoni	1000	5	170	10	1185
32.	Others	70	10	55	20	155
	TOTAL	1910	48	468	71	2497
VII.	Maharashtra					
33.	Bhandara	30	0	15	0	45
34.	Chandrapur	25	0	12	0	37
35.	Garhchiroli	60	0	30	0	90
36.	Gondia	510	0	500	0	1010
	TOTAL	625	0	557	0	1182
VIII.	Meghalaya (Garo hills)	160	0	8	0	168
IX.	Odisha					
37.	Balasore	15	2	15	10	42
38.	Koraput	20	8	5	5	38
39.	Mayurbhanj	5	5	10	100	120
40.	Nabarangpur	15	20	20	40	95
41.	Sundergarh	2	200	0	80	282
42.	Keonjhar	0	8	0	15	23
43.	Others	30	8	15	20	73
	TOTAL	87	251	65	270	673
X.	Uttar Pradesh	40	0	50	0	90
XI.	West Bengal					
44.	Bankura	10	0	15	0	25
45.	Midnapur	120	0	100	0	220
46.	Purulia	30	40	25	55	150
47.	Others	25	20	40	20	105
	TOTAL	185	60	180	75	500
	GRAND TOTAL	5227	7526	3215	5040	21008

Table-32: Lac producing areas in the country

Sl. No.	Name of State/ District	Major lac producing areas
I.	Andhra Pradesh	
1.	Adilabad	Utnoor
2.	Vishakhapatnam	Paderu
II.	Assam	
3.	Kamrup	Boko
4.	Karbi-Anglong	Amtreng, Baithalansu
5.	Marigaon	Nellei
6.	Nagaon	Amsoi, Hojai
III.	Bihar	
7.	Gaya	Raniganj
8.	Jehanabad	Malichak
IV.	Chhattisgarh	
10.	Balrampur	Chando, Dharmi, Wandrafnagar
11.	Bastar	Keshkal
12.	Bilaspur	Gaurella, Kota, Lorami, Pendra
13.	Dhamtari	Gatta Silli, Nagri, Sihawa
14.	Durg	Balod, Daudi, Dondi-Lohara, Kusumkasa
15.	Gariyaband	Amlipadar, Chhaila, Chhura Gariyaband, Indagaon, Mainpur, Udanti
16.	Janjgir-Champa	Sakti, Saragaon
17.	Kanker	Antagarh, Bhanupratapur, Biragaon, Kondagaon, Korar, Narharpur, Sambalpur
18.	Korba	Bhaisama Bazar, Chaitama, Chhuri, Haldi Bazar, Kartala, Katghora, Korbi, Madanpur, Pali, Pasan, Pasarkhet
19.	Korea	Bhartarpur, Kusmi
20.	Mahasamund	Bagbahara, Basana, Khalari, Mahasamund, Pithora, Tendukona
21.	Narayanpur	Narainpur
22.	Raigarh	Dharmjaigarh, Lailunga, Pathalgaon, Tamnar
23.	Raipur	Abhanpur

Sl. No.	Name of State/ District	Major lac producing areas
24.	Rajnandgaon	Aawadhi, Bharitola, Khardi, Manpur, Mohalachowki
25.	Sarguja	Chalgi, Mainpat, Pasta, Pratappur, Premnagar, Raghunathnagar, Ramanujanj,
V.	Gujarat	
26.	Panchamahhal	Dakor, Godhara, Ghoghamba, Nadiad and Santrampur
27.	Vadodara	Chhota Udepur, Devhant, Jambaguda, Jatpurpavi, Jhonjh, Kawant, Keori, Kundal Ghata, Tejgadh and Zoz
VI.	Jharkhand	
28.	Chatra	Tandwa
29.	Garhwa	Bargarh, Garhwa, Godarmana, Rakshi, Ramganga, Ramkonda, Ranka
30.	Gumla	Chainpur, Dumari, Kanshir, Palkot, Patratoli, Raidih
31.	Khunti	Murhu, Soeko Torpa, Karra, Rania, Tapkara
32.	Latehar	Balumath, Barwadih Brahmani, Chandwa, Garu Latehar, Manika, Sarju, Satbarwa
33.	Palamu	Matalong, Panki, Raj Chaipur,
34.	Ranchi	Angara, Banta, Birbanki, Bundu, Jonha, Namkum, Ormanjhi, Silli, Maranghada, Sonahatu, Tamar
35.	Simdega	Bano, Hating hode, Jaldega, Kolebira, Lachragarh
36.	West Singhbhum	Anandpur, Bandgaon, Baskata, Chaibasa, Chakradharpur, Goelkera, Lodai, Manoharpur, Sonuwa, Toklo
VII.	Madhya Pradesh	
37.	Anuppur	Jaitahari, Keshwahi, Kotma, Venkatnagar
38.	Balaghat	Baihar, Katangi, Lalbarra, Lamta, Langi, Parashwada, Waraseoni
39.	Chhindawada	Damoia
40.	Dindori	Bazak, Bhanupur, Karanjia, Ramnagar, Rampur
41.	Hosangabad	Bankhedi, Babai, Daggrai, Darawpadaw, Hapa, Jonahata, Kekra, Lokamti, Pipariya

Sl. No.	Name of State/ District	Major lac producing areas
42.	Mandla	Bichhia, Chabbi, Ghughari, Kalpi, Mahegaon, Mavai, Nainpur, Narainganj, Navas-Bablia
43.	Narshinghpur	Chichli, Godarwara, Kalakhar, Kalyanpur, Nayakheda, Salechauka
44.	Seoni	Barghat, Ghansore, Kahani, Kanewara, Keolari, Khamaria, Khari
45.	Shahdol	Burhar, Jaitpur, Sohagpur
VIII.	Maharashtra	
46.	Bhandara	Gobarwahi, Nakadongri
47.	Chandrapur	Bandh, Navargaon
48.	Garhchiroli	Allapalli, Bamragarh
49.	Gondia	Amgaon, Chopa, Goregaon, Hirapur, Kampta, Kati, Kotjamura, Kurodhi, Salekasa, Tiroda
IX.	Meghalaya	
50.	Garo Hills	Damra, Dodno, Nongpoh, Tura
X.	Odisha	
51.	Balasore	Haldipada, Jaleswar, Nilagiri
52.	Keonjhar	Telkoi
53.	Koraput	Ramgiri
54.	Mayurbhanj	Jashipur, Kaptipada, Karanjia, Kusumi, Padampokhari, Sarat, Thakurmunda, Udala,
55.	Nabarangpur	Chandahandi, Raighar
56.	Sundergarh	Gurundia, Khandadhar, Kutra, Rajgangpur
XI.	Uttar Pradesh	
57.	Sonbhadra	Doodhi
58.	Allahabad	Koraon, Meja
XII.	West Bengal	
59.	Bankura	Idpur, Khatra, Raipur, Ranibandh,
60.	Midnapur	Katai, Kuti, Moyna, Panskurah, Ramnagar, Tamluk
61.	Purulia	Ajodhya Pahar, Baghmundi, Balarampur, Jhalda, Kashipur, Kutidih, Raghunathpur, Tulin

Table-33: Gums producing districts and areas

Sl. No.	Name of State/ District	Major gum producing areas
I.	Andhra Pradesh	
1.	Adilabad	Jannaram, Kamma Reddy, SK Nagar and Uttoor
2.	Chittur	Chittur, Kaddapa and Nellore
3.	East Godavari	Addategella, Maredumilli, Rajavomma Kangi and Rampachodavaram
4.	Khammam	Bhadrachalam, Chintoor, Dammapeta and Kukunaru
5.	Mahboobnagar	Mannanoele, Nanjaria and Pedadornala
6.	Srikakulam	Pathpattanam and Setampeda
7.	Visakhapatnam	Arku, Chintapalli, GK Vidhi, G. Murugala, Kashipatnam, Koyuru, Munchingput, Paderu and Petabayallu
8.	Vizianagram	Gummalaxmipuram, Parvatipuram and Salur
9.	Warangal	Etrunagram, Mulug and Narshimhpada
10.	West Godavari	AR Puram
II.	Chhattisgarh	
11.	Balrampur	Chando, Dharmi
12.	Bastar	Jagdapur, Keshkal
13.	Bilaspur	Dindori, Lormi, Mugeli, Ratanpur and Takhtpur
14.	Dhamtari	Gatta Silli, Nagri, Sihawa
15.	Gariyaband	Amlipadar, Chhaila, Chhura Gariyaband, Indagaon, Mainpur, Udanti
16.	Janjgir-Champa	Sakti, Saragaon
17.	Kanker	Antagarh, Bhanupratapur, Biragaon, Kondagaon, Korar, Narharapur, Sambalpur
18.	Korba	Bhaisama Bazar, Chaitama, Chhuri, Haldi Bazar, Kartala, Pali, Pasan, Pasarkhet
19.	Korea	Bhartarpur
20.	Mahasamund	Bagbahara, Basana, Khalari, Pithora
21.	Narayanpur	Narainpur

Sl. No.	Name of State/ District	Major gum producing areas
22.	Raigarh	Khamariya, Dharmjaigarh, Manendragarh Milupara, Pathalgaon
23.	Raipur	Abhanpur
24.	Rajnandgaon	Khardi, Manpur, Mohala-chowki
25.	Sarguja	East Sarguja, South Sarguja
26.	Sukma	Sukma
27.	Bijapur	Bijapur, Bairamgarh, Bhopalpatnam, Usoo
28.	Dantewada	Dantewada, Geedam, Kuwakonda, Katekalyan
III.	Gujarat	
29.	Balsar	Dharampur, Malanpada and Pangarbari
30.	Banskantha	Ambaji, Pata and Virampur
31.	Bharuch	Jaghadiya and Jankhawav
32.	Dahod	Baria and Sagtala
33.	Dang	Ahwa and Waghai
34.	Kuchachh	Bhachau, Bhirandiyara, Bhuj, Dwarika, Mandvi, Nakhatrana and Rapar
35.	Narmada	Dediapada, Mandvi and Rajpipla
36.	Navsari	Ankalachh, Bansda and Chikhali
37.	Panchamahhal	Dakor, Ghoghamba, Nadiad and Santrampur
38.	Sabarkantha	Bhiloda, Choriwada Modasa and Posina
39.	Vadodara	Chhota Udepur, Devhant, Jambaguda, Jatpurpavi, Kawant, Tejgad and Zoz
IV.	Jharkhand	
40.	Chatra	Lawalang, Pratappur and Kanti
41.	Garhwa	Ramkanda and Bhandaria
42.	Gumla	Dumari, Kanshir, Palkot, Patratoli, Raidih
43.	Khunti	Murhu, Soeko Rania, Tapkara
44.	Latehar	Garu, Mahuadar, Herhanj, Balumath, Barwadih, Lesliganj, Chhipadohar and Richughutu
45.	Palamu	Daltonganj, Panki, Chhatarpur
46.	Ranchi	Angara, Bundu, Jonha, Sonahatu, Tamar

Sl. No.	Name of State/ District	Major gum producing areas
47.	West Singhbhum	Chakradharpur
V.	Madhya Pradesh	
48.	Balaghat	Kochewahi, Baihar, Lamta, Langi, Paraswada
49.	Betul	Savani
50.	Chhindawada	Amarwada, Damua, Patalkot
51.	Hosangabad	Pipariya
52.	Mandla	Pindarai, Bamhani, Mohgaon, Lingapondi, Bichhia, Chabbi
53.	Narshinghpur	Chichli, Godarwara, Kalakhar, Kalyanpur, Nayakheda, Salechauka
54.	Seoni	Bhimgarh, Chhopara, Dhuma
VI.	Maharashtra	
55.	Bhandara	Gobarwahi, Nakadongri
56.	Chandrapur	Mul
57.	Garhchiroli	Armon, Wadsa, Desai ganj
58.	Gondia	Salekasha, Amgaon, Goregaon, Dhapewada, Tiroda, Navegaon Bandh
59.	Wardha	Dhagabhawan, Navargaon, Hingni, Bordhara, Karanja range
VII.	Odisha	
60.	Balasore	Haldipada, Jaleshwar, Nilagiri
61.	Keonjhar	Telkoi
62.	Koraput	Ramgiri
63.	Mayurbhanj	Jashipur, Kaptipada, Karanjia, Kusumi, Padampokhari, Sarat, Thakurmunda, Udala,
64.	Nabarangpur	Chandahandi, Raighar
65.	Sundergarh	Gurundia, Khandadhar, Kutra, Rajgangpur
VIII.	Rajasthan	
66.	Ajmer	Beawar, Kekerri, Kisangarh, Nasserabad, Puskar
67.	Alwar	Bansur, Rajgarh, Ramgarh, Thanagazi
68.	Churu	Sardarsahar, Sujangarh, Taranagar

Sl. No.	Name of State/ District	Major gum producing areas
69.	Jaipur	Amer, Bassi, Chomu, Chaksu, Jamwa Ramgarh, Kotputli, Phagi, Phulera
70.	Jhunjhunu	Chirawa, Khetri, Navalgarh
71.	Jodhpur	Bilara, Luni, Phalodi, Shergarh
72.	Nagour	Ladnu, Merta, Parbatsar
73.	Pali	Bali, Sojat, Sumerpur
74.	Sikar	Fatehpur, Neem-ka-Thana, Ringus, Sri Madhopur
75.	Tonk	Niwai, Malpura, Uniara
76.	Udaipur	Gogunda, Kotra

Table 34. Legal categorization of major gums produced in various states of India (in tons)

Sl. No.	State /Year	Name of the gum produced	Name of the tree	Category
1.	Andhra Pradesh	Gum <i>dikamali</i>	<i>G. gummifera</i>	Monopoly
2.		Gum <i>kondagogu</i>	<i>C. religiosum</i>	Monopoly
3.		Gum <i>olibanum</i>	<i>B. serrata</i>	Monopoly
4.		Gum <i>thiruman/dhawada</i>	<i>A. latifolia</i>	Monopoly
5.		Karaya gum	<i>S. urens</i>	Monopoly
6.	Chhattisgarh	Babool gum	<i>A. indica</i>	Nationalized
7.		Bahera	<i>Terminalia bellirica</i>	Non-nationalized
8.		Char, tanwar, dikamali	<i>Gardenia gummifera</i>	Non-nationalized
9.		Gum <i>thiruman/dhawada</i>	<i>A. latifolia</i>	Nationalized
10.		Jhingan	<i>Lannea coromandeliga</i>	Non-nationalized
11.		Karaya gum	<i>S. urens</i>	Nationalized
12.		Khair gum	<i>A. catechu</i>	Nationalized
13.		Saja	<i>Terminalia tomentosa</i>	Non-nationalized
14.	Gujarat	Babool gum	<i>A. arabica</i>	Nationalized
15.		Guggul gum	<i>C.wightii/mukul</i>	Nationalized

Sl. No.	State /Year	Name of the gum produced	Name of the tree	Category
16.		Gum <i>thiruman/ dhawada</i>	<i>A. latifolia</i>	Nationalized
17.		<i>Karaya</i> gum	<i>S. urens</i>	Nationalized
18.		<i>Khair</i> gum	<i>A. catechu</i>	Nationalized
19.		Prosopis gum	<i>P. juliflora</i>	Nationalized
20.		<i>Saja</i>	<i>Terminalia tomentosa</i>	Nationalized
21.		<i>Salai</i> Gum	<i>B. serrata</i>	Nationalized
22.	Jharkhand	<i>Dhawada</i>	<i>A. latifolia</i>	Non-nationalized
23.		<i>Karaya</i> gum	<i>S. urens</i>	Non-nationalized
24.		<i>Babool</i> gum	<i>A. indica</i>	Non-nationalized
25.		<i>Jhingan</i>	<i>L. coromandeliga</i>	Non-nationalized
26.		<i>Palas</i>	<i>Butea monosperma</i>	Non-nationalized
27.		<i>Salai</i> gum	<i>B. serrata</i>	Non-nationalized
28.		<i>Char</i>	<i>Buchanania lanzan Spreng</i>	Non-nationalized
29.	Madhya Pradesh	<i>Dhawada</i>	<i>A. latifolia</i>	Non-nationalized
30.		<i>Karaya</i> gum	<i>S. urens</i>	Nationalized
31.		<i>Babool</i> gum	<i>A. nilotica</i>	Non-nationalized
32.		<i>Salai</i> Gum	<i>B. serrata</i>	Non-nationalized
33.		<i>Khair</i> gum	<i>A. catechu</i>	Non-nationalized
34.	Maharashtra	<i>Dhawada</i>	<i>A. latifolia</i>	Nationalized
35.		<i>Karaya</i> gum	<i>S. urens</i>	Nationalized
36.		<i>Babool</i> gum	<i>A. nilotica</i>	Nationalized
37.		<i>Jhingan</i>	<i>L. coromandeliga</i>	Nationalized
38.		<i>Khair</i> gum	<i>A. catechu</i>	Nationalized
39.	Rajasthan	<i>Babool</i> gum	<i>A. nilotica</i>	Nationalized
40.		<i>Babool</i> gum	<i>A. indica</i>	Nationalized
41.		<i>Khair</i> gum	<i>A. catechu</i>	Nationalized
42.		<i>Prosopis</i> gum	<i>P. juliflora</i>	Nationalized
43.	Odisha	All gums	-	Nationalized

Appendix-I

Lac culture- Monthly Time Table

Month	Activity
January	Forecast of larval emergence from winter crop. Pruning of new <i>kusum</i> trees.
February	Pruning of new <i>kusum</i> trees. Harvesting of winter crop and simultaneously pruning of trees. Inoculation of summer crop using nylon net. <i>Phunki</i> removal and scraping.
March	First spray of pesticide (insecticide and fungicide) on lac culture (if needed).
April	Second spray of pesticide at 60 days of inoculation (only if necessary).
May	Spray of pesticide, if attack of <i>Chrysopa</i> is seen (but not between 65-90 days after inoculation).
June	Forecast of larval emergence and estimation of yield from summer crop. Estimation of broodlac requirement for inoculation of winter crop.
July	Harvesting of summer crop partially or fully as per requirement after observing yellow spot. Inoculation of winter crop. <i>Phunki</i> removal and scraping.
August	First spray of pesticide, between 25-30 th day of inoculation.
September	Second spray of pesticide between 38-40 days of inoculation.
October	Third spray of pesticide between 60-65 days (if needed).
November	Make arrangement to prevent theft of winter crop.
December	Estimation of yield from winter crop.
	Estimation of broodlac requirement for summer crop.

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NOTES



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