



Lac, Plant Resins and Gums Statistics 2017: At a Glance



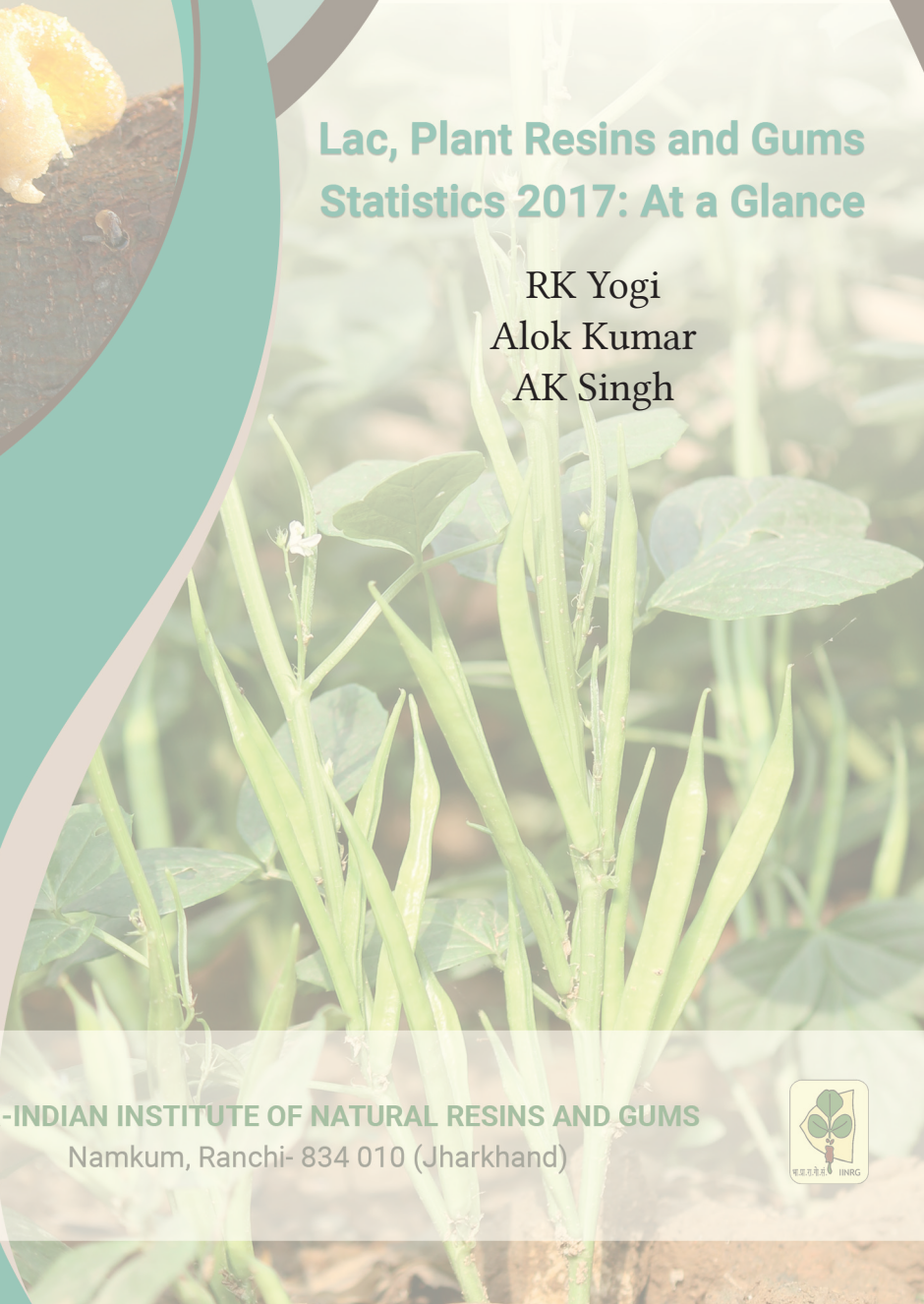
ICAR-INDIAN INSTITUTE OF NATURAL RESINS AND GUMS
Namkum, Ranchi- 834 010 (Jharkhand)





Lac, Plant Resins and Gums Statistics 2017: At a Glance

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Left to right :

Column 1 - Natural gum: *Babool* gum (*A. nilotica*)

Column 2 - Plant of *guar* or cluster bean (*Cyamopsis tetragonoloba*)

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Foreword

India has the leading role in supplying the Non Wood Forest Products (NWFPs) based raw material for food, paint, varnish, cosmetic and pharmaceutical industries over the world. India has about 621.4 million lac host trees and not more than 5% of this huge inoculable area is utilized for production (FSI 2013). Utilizing full potential of available host plants for lac cultivation with recommended technologies may be promising strategy to check the migration and providing the opportunities for employment at local level. Subsequently, it will enhance the income level and by thus standard of living of the tribal farmers. Government of India has initiated the Minimum Support Price (MSP) for 11 NWFPs as marketing strategy on the top priority to boost up the sector.

India is one of the largest producers of natural resins, gums and gum-resins (NRGs) along with China, Indonesia, Russia and Brazil. Our country is the world leader in production of *guar*, gum *karaya* and psyllium gums as well as lac. The present publication, 'Lac, Plant Resins and Gums Statistics 2017: 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, gum *karaya*, *dhawda* gum, *psyllium* gum, tamarind gum powder, *Cassia tora*, *Olibanum*, etc. The production of gums in important states, viz, Chhattisgarh, Madhya Pradesh, Gujarat, Rajasthan 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 picture of the importance of these at national and international level.

In this issue, content is presented in five major headings covering introduction; methodology; production, processing and trade; policy implications and conclusions. Information on market trend is essential for better organization of Indian producing states to meet the demand through better organization of their local/regional/national commercial channels from production to export. Further, stabilization of the market with appropriate stocks, quality control of exported products at global level and adequate remunerative price support at production level in India is also covered. In this issue, data pertaining the comparison of XI and XII plan periods is highlighted.

The statistics presented in this publication offer valuable insights of NRG sector. I am sure that the information and data contained in this bulletin would be useful to all the stakeholders of NRG sector. Authors made every effort to distill and condense a very large and diverse topic into an approachable volume. My appreciation goes to authors for their efforts made in bringing out this bulletin. Suggestions and inputs are sought from stakeholders for improvement of this publication in future.

Ranchi


(KK Sharma)

Director

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INTRODUCTION

Forests support the livelihoods of a vast number of people through subsistence use of products, such as food, fodder, and medicinal plants; cash income obtained from sale of products; and more indirect ecological benefits such as the contributions of forests and trees to agricultural productivity and environment. The links between tree cover, access to food and improved dietary diversity are also becoming increasingly evident. While the benefits from forests are numerous, the tangible benefits like timber, bamboo, fuel wood, fodder, Non-Wood Forest Products (NWFPs), *etc.*, are quantifiable. Intangible benefits like maintenance of ecological balance, conservation of soil and moisture, regulating the water flow, carbon sequestration, *etc.*, are not quantified but are of great significance.

It is believed that the complex and context-dependent nature of sustainable forest use in a future bio-economy as an issue that cannot be managed at the corporate level, but is dependent on perceptions, values, and levels of industry knowledge among stakeholders. Because the subsistence use and ecological values of forests in many cases are 'invisible' and the commercial contributions tend to be underestimated, natural resource accounting methods also often fail to acknowledge the role of forest products for local livelihoods (PROFOR, 2008).

NWFPs are considered as income potential as well as plays an important role as food security to forest dwellers and communities living around the forest patch of the country (Vivero, 2002). As per the definition of Food and Agriculture Organization (FAO) NWFPs are the Goods of Biological Origin other than wood derived from the forest. Though there is no official census figures for the forest dependent population in the country, different estimates put the figures from 275 million (World Bank, 2006) to 350- 400 million (MoEF, 2009). These NWFPs may be in the form of leaves, flowers, seeds, fruits, stems, tannin, gums and resins, herbs, medicinal plants, bamboos *etc.* which are the source of income to about 350 millions of people across the world (Mukul, *et al.* 2014; Bhat, 2012) and 50 millions of people in India (Bhat, 2012). NTFPs contribution to the rural livelihood is an immense value to local people (Sangma and Lalnundanga, 2019). All local people from forest villages extract a variety of NWFPs from the nearby forest area (Tynsong and Tiwari, 2011) which is an old age practice in India as well as in the whole world (Yadav *et al.*, 2019c). In India, about 15000-18000 plant species were reported, out of which about 3000 species yield NWFPs (Murthy *et al.*, 2005). However, only 126 species yielding NTFPs which have been commercialised in India (Maithani, 1994; Murthy *et al.*, 2005 and Yadav *et al.*, 2019c).

Forest is an important sector having a significant contribution to the Indian economy. According to the Forest Survey of India, 2017 forest cover is about 23.34% of the total geographical area of the country. Forest produce based industries contribute to 1% of total gross capital formation (GCF). Applying IPCC-predicted temperatures and projecting India's recent trends in precipitation, and assuming no policy responses, give rise to estimates for farm income losses of 15 % to 18 % on average, rising to 20 -25 % for unirrigated areas. At current levels of farm income, that translates into more than Rs. 3,600 per year for the median farm household (Economic Survey, Ministry of Finance, 2017). The global macroeconomic landscape is currently chartering a rough and uncertain terrain characterized by weak growth of world output. The situation has been exacerbated by; (i) declining prices of a number of commodities, with reduction in crude oil prices being the most visible of them, (ii) turbulent financial markets (more so equity markets), and (iii) volatile exchange rates. These conditions reflect extreme risk-aversion behavior of global investors, thus putting many, and in particular, commodities exporting economies under considerable stress. Even in these trying and uncertain circumstances, India's growth story has largely remained positive on the strength of domestic absorption, and the country has registered a robust and steady pace of economic growth in 2015-16 as it did in 2014-15.



In past, as per the Forest Act 1927 lac secreted by a tiny insect *Kerria lacca* is defined as the forest product as collected by the forest dwellers. Subsequently the transformation of the rural structure, farmers started its cultivation scientifically on various lac host trees. Recently a bushy plant is also introduced by the institute in various states. Consequently, the more than 95% production is routed through the farming community and it is no more the collection by the forest department. Hence, a policy interventions need to be taken to declare it as an agricultural produce.

The share of agriculture and allied sectors in GVA declined from 18.2 % in 2012-13 to 16.4% in 2017-18. The share of forestry and loggings to the GVA of the country has also been declining and it is fluctuating between 1.58% in 2013-14 to 1.3 % in 2016-17.

According to ITC calculations based on UN COMTRADE statistics, the world trade aggregation of lac, natural gums, resins, gum-resins and balsams during 2016 was about 1278.67 million US dollars. Out of this, the world export aggregation of lac, natural gums, resins, gum-resins and balsams during 2015 was about 465.03 million US dollars. Share of NRGs in India's total import (₹24902.98 billion in 2015-16 & ₹25776.65 billion in 2016-17) has been remained stagnant at 0.05% (₹12.91billion) in 2015-16 and 0.05% (₹13.71 billion) in 2016-17. Share of NRGs in India's total export (₹17163.84 billion in 2015-16 & ₹18494.28 billion in 2016-17) has been decreased from 0.20% (₹34.40 billion) in 2015-16 to 0.17% (₹31.08 billion) in 2016-17 with an annual deceleration of 9.65 % (Department of Commerce, 2018).

A decadal data (2008-2016) on world EXIM aggregation of lac, natural gums, resins, gum-resins and balsams were analyzed and presented in Figure 1 and Figure 2. Since 2012, deceleration in the value of world export aggregation was observed and stagnation was found in the value of world import aggregation during the similar period.

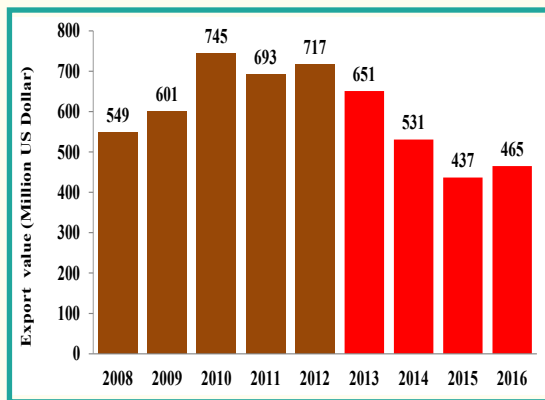


Figure 1. World export flow of lac, natural gums, resins, gum-resins and balsams during XI & XII plan

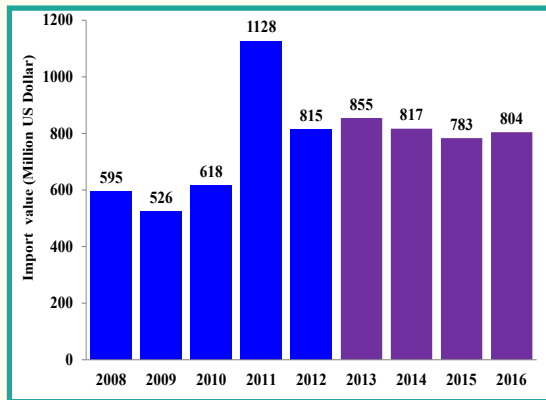


Figure 2. World import flow of lac, natural gums, resins, gum-resins and balsams during the decade

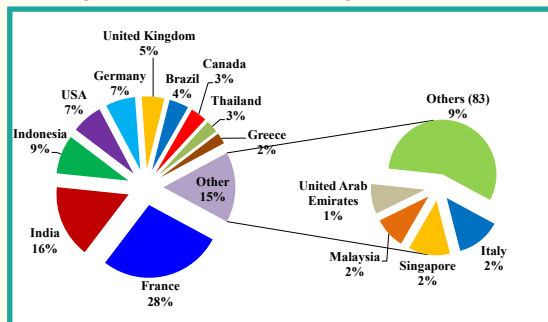


Figure 3. Break up of the World export aggregation of NRGs

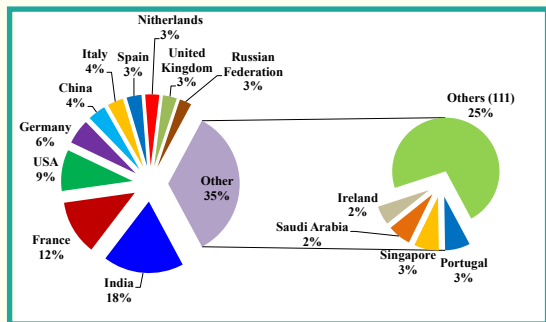


Figure 4. Breakup of the World import aggregation of NRGs





Major suppliers of NRGs contributing about 92 % share in international market are France (27.6%), India (16.2%), Indonesia (8.6%), USA (6.9%), Germany (6.6%), UK (5.1%), Brazil (4.3%), Canada (3.6%), Thailand (2.8), Greece (2.4%), Italy (2.0%) Singapore(1.95), Malaysia(1.46) and United Arab Emirates(1.39). Rests of the 8.8% NRGs are supplied from 83 countries across the world (Figure 3). Similarly, the world import aggregation of lac, natural gums, resins, gum-resins and balsams during 2016 was about 804.37 million US dollars. Major importers of NRGs contributing about 75% share in the international market are India (18.2%), France (12.4%), United States of America (9.3%), Germany (5.6%), China (4.0%), Italy (3.6%), Spain (3.4%), Netherlands (3.2%), United Kingdom (3.2%), Russian Federation (2.7%), Portugal (2.6%), Singapore (2.6%), Saudi Arabia (2.4%) and Ireland (2.0%). During 2016, rests of the 25% demand of NRGs aroused from the 65 countries across the world (Figure 4).

About 70% of the NWFP collection in India takes place in the tribal belt of the country (Mitchell *et al.*, 2003). Around 55% of employment in forestry sector is attributed to this sector alone (Joshi, 2003). NRGs of commercial importance like lac (*Kerria lacca* Kerr), pine resin (*P. roxburghii* Sarg.), guar gum (*Cyamopsis tetragonoloba* L.), gum karaya (*Sterculia urens* Roxb.), dhawada gum (*Anogeissus latifolia* Roxb.), tamarind gum (*Tamarindus indica* L.), char/piyar gum (*Buchanania lanzan* Spreng.) and babool gum (*Acacia nilotica* L.) are produced in India. India holds monopoly in international trade over some of the NRGs such as lac, gum karaya and guar gum.

NWFPs based on their chemical composition 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. Resins are secretion of several plants, particularly coniferous trees.

Resins are used in the production of varnishes, adhesives and food glazing agents. These are also used as raw material for synthesis 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 high viscosity in the 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, tree exudates *e.g.* gum arabic, gum ghatti, gum tragacanth, gum karaya, guar gum, locust bean gum, chicle gum, dammar, mastic gum, psyllium gum 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).

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 and obtained from the plants. Olibanum/salai gum (*Boswellia serrata*), guggal (*Commiphora wightii*), myrrh, asafoetida, *etc.* are the major gum resins of national importance.



Table 1. World EXIM trade aggregation of lac, natural gums, resins, gum-resins and balsams
(Value in Million US\$)

Year	Export	Import	Re-Export	Re-Import	Total Trade
2006	669.12	559.72	11.77	0.75	1241.35
2007	470.47	575.00	11.82	1.50	1058.79
2008	548.82	594.65	13.26	0.12	1156.86
2009	601.20	526.39	19.94	0.24	1147.76
2010	745.48	617.75	15.46	0.20	1378.89
2011	693.28	1127.70	15.12	0.55	1836.64
2012	716.89	814.98	17.88	0.24	1550.00
2013	650.94	854.70	17.06	0.31	1523.02
2014	530.78	816.86	10.43	0.37	1358.44
2015	436.70	783.45	5.87	0.58	1226.60
2016	465.03	804.37	9.06	0.20	1278.67

Source: ITC calculations based on UN COMTRADE statistics.

With an objective of enhancing carbon sinks and empowering local communities with appropriate adaptation measures, the Green India mission under the National Action Plan on Climate Change (NAPCC) targets 1.5 Mha of degraded agricultural land and fallows to be brought under agroforestry; about 0.8 Mha under improved agroforestry practices on existing lands; and 0.7 Mha of additional lands under agroforestry (MoEF 2010). India ratified the Paris Agreement on 2nd October 2016. India's comprehensive NDC target is to lower the emissions intensity of GDP by 33 to 35 per cent by 2030 from 2005 levels, to increase the share of non-fossil fuels based power generation capacity to 40 per cent of installed electric power capacity by 2030, and to create an additional (cumulative) carbon sink of 2.5–3 GtCO₂e through additional forest and tree cover by 2030 (Economic Survey, 2016-17).



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. 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.

The objectives of present methodology are to estimate and update the production, processing and value addition 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 are collected/procured through the local traders/societies/forest departments. This report presents an overview of quantity and values for selected forest products and services from Indian forests. Results highlight a strong concentration of value in *guar* gum production. The economic value of NWFPs however is only partly reflected on the market and recorded by official statistics. Underestimation by existing statistics might be due to several reasons, including: (i) the public-good nature of many products/services and consequent difficulties in estimating them; (ii) the fact that data recorded for official statistics are not always complete (for example they do not always cover all the region as in the case of NWFPs); and (iii) the fact that a certain proportion of the NRGs is not mirrored by official data because some products are traded through informal channels and markets.

Traders/federations are limited in number but 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 pass 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). In the Indian context, the data relating to India's exports and imports by commodities is officially compiled and published by the DGCI&S, Government of India. The data is compiled in accordance with the Harmonized Commodity Description and Coding System, also known as the Harmonized System (HS) of tariff nomenclature, developed and maintained by the World Customs Organization (WCO) and adopted by the Government of India as Indian Trade Classification, commonly called ITC (HS) codes. Export and import data on NRGs & related products were obtained from Directorate General of Commercial Intelligence and Statistics (DGCI&S), Kolkata as well as from the Department of Commerce, Ministry of Commerce and Industry. 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 secondary data on 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. Surveys were made in various NRG producing areas of the country for collection of data throughout the year during 2016-17. The requisite data were 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.

Table 2. Details of the areas covered under the surveys during 2016-17

States/Country	Districts
Andhra Pradesh	Vishakhapatnam and East Godavari
Assam	Kamrup and Dhemaji
Bihar	Muzaffarpur and East Champaran
Chhattisgarh	Balarampur, Bilaspur, Dhamtari, Korba, Kanker, Korea and Raipur
Delhi	Chandni Chok
Gujarat	Bharuch, Surat and Vadodara
Himachal Pradesh	Sirmaur
Jharkhand	Bokaro, Dhanbad, Giridih, Gumla, Khunti, Ranchi, Simdega and West Singhbhum
Karnataka	Bangaluru and Uttara Kannada
Madhya Pradesh	Balaghat and Seoni
Maharashtra	Bhandara and Gondia
NE region	Garo hills, Imphal, East Kameng, Barapani and Kohima
Odisha	Balasore and Sundergarh
Rajasthan	Ajmer, Jaipur, Jodhpur and Udaipur
Uttar Pradesh	Allahabad
Uttarakhand	Dehradun
Telangana	Hyderabad
West Bengal	Kolkata and Purulia
Nepal	Kathmandu



Table 3. Distribution of the sample size during the survey in 2016-17

States/ Country	No. of districts	Farmer	Market functionary	Processor/ Manufacturer/ Exporters	Govt. Official/ NGOs/ Other key informant	Total
Andhra Pradesh	1	0	0	0	2	2
Assam	2	50	1	0	34	85
Bihar	1	0	0	0	1	1
Chhattisgarh	22	500	36	18	383	937
Delhi	2	0	20	0	152	172
Gujarat	2	11	13	0	28	52
Himachal Pradesh	1	0	1	2	2	5
Jharkhand	5	70	10	4	36	120
Karnataka	1	1	0	0	3	4
Madhya Pradesh	4	72	4	4	10	90
Maharashtra	6	0	16	6	24	46
NEH	2	0	0	0	4	4
Odisha	1	4	1	2	4	11
Rajasthan	2	50	40	6	49	145
Telangana	1	0	0	0	3	3
Uttar Pradesh	1	0	0	2	7	9
Uttarakhand	1	0	5	0	13	18
West Bengal	4	0	2	2	14	18
Others	0	240	10	0	30	280
Total	59	998	159	46	799	2002

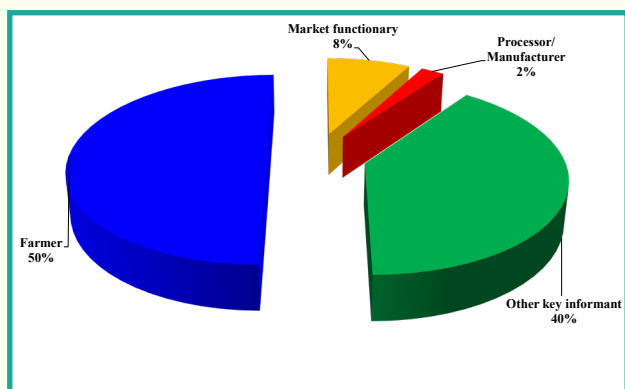


Figure 5. Composition of stakeholders under survey program (Category wise)

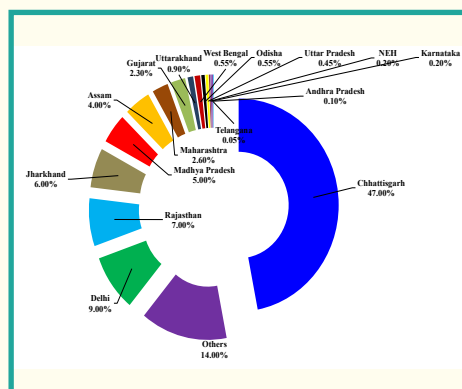


Figure 6. Composition of stakeholders under survey program (State-wise)



Surveys were conducted in 59 districts of more than 18 states of India and Nepal covering 2002 stakeholders including 799 institutions (Govt. Officials/ NGOs/ Other key informant), 998 farmers, 159 market functionaries (traders/ wholesalers), 46 processors/ Manufacturer /exporters/importers and resource persons were interacted through visits and telephonic conversations during 2016-17. These respondents were directly/indirectly concerned with NRG production, processing and value addition over the country. Name of the states and districts which were covered under survey and sample size surveyed during the year have been presented in Table 2 and Table 3, respectively. Category wise and state-wise composition of selected stakeholders is presented in Figure 5 and Figure 6.



PRODUCTION, PROCESSING AND TRADE IN NRGs

NRG production level during 2016-17 was estimated comparatively lower (5,66,229 tons) than previous year (8,43,178 tons). 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 4 and Figure 7.

Table 4. Total NRG production and trade during 2016-17 (quantity in tons)

Name of product	Production	% share	Export	% share	Import	% share
<i>Guar</i> gum*	542200.00	95.75	318066.77	94.84	66.85	0.06
Lac	16352.00	2.89	7241.00	2.16	NA	0
Pine resin	5772.90	1.02	142.64	0.04	43098.06	39.26
<i>Karaya</i> gum	145.00	0.03	186.90	0.06	912.55	0.83
Other NRGs	1760.00	0.31	9740.76	2.90	65687.18	59.85
Total	566229.90	100.00	335378.07	100.00	109764.64	100.00

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

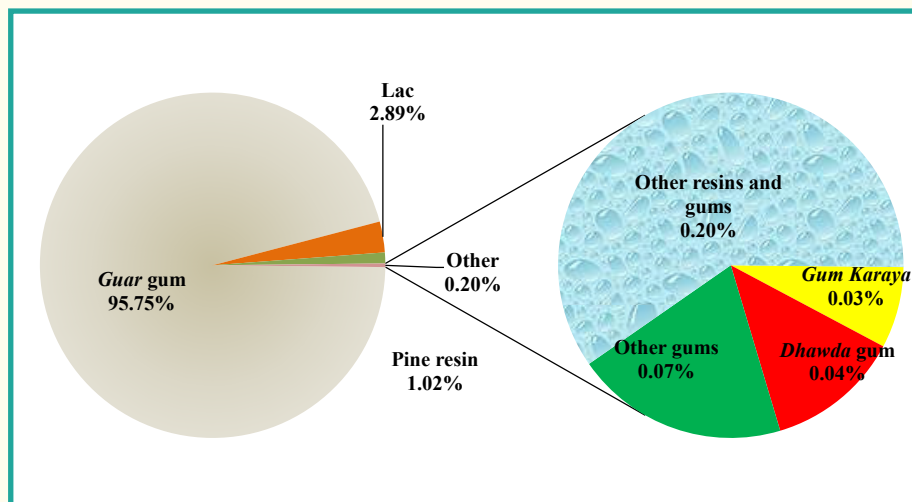


Figure 7. Product/major group-wise production share of NRGs

It is evident from the Table 4 that *guar* gum has a lion's 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 decreased by 5.57% in comparison to previous year export. Consequently, the value of exported lac was declined by 16.42%. Only less than 1.5% production of the total NRGs is contributed by pine resins, gum *karaya* and other NRGs. Export under gum *karaya* and other NRGs has exceeded the production data as the exported quantity supplied from the carry over stock and secondly, raw material imported and exported after processing in India. Overall, there was about 23% increase in total quantity of NRGs exported and quantity in import basket was increased by 14% over the previous year. But, price fall of *guar* gum in international market resulted with a decline of 10% in total foreign exchange earnings as comparison



to previous year of 2015-16. The detailed information about state-wise production processing and trade of natural resins (Lac, pine resin), natural gums (Gum *karaya*, *guar* gum, gum *ghatti*, *gum arabic*) and natural gum resins (Olibanum, myrrh, asafoetida) is presented below.

A. NATURAL RESINS

Lac – a fauna based natural resin

An Indian lac insect, *Kerria lacca* (Kerr) which thrives on the tender twigs of specific host trees viz., *palas* (*Butea monosperma*), *ber* (*Ziziphus mauritiana*), *kusum* (*Schleichera oleosa*), *Flemingia semialata*, *Ficus spp.* etc. secretes natural resin (known as Lac) It is cultivated and collected by the forest dwellers in India. *Rangeeni* and *kusmi* are the two strains of lac insect which are classified based on preference of the insect for specific host plants. Raw lac is the source of three valuable products i.e. resin, dye and wax.



Photo 1. Preparation of the machine made shellac

Lac cultivation is an important source of income for livelihood of the forest and sub-forest dwellers of Jharkhand, Chhattisgarh, Madhya Pradesh, West Bengal, Maharashtra, Odisha and parts of Uttar Pradesh, Andhra Pradesh, Gujarat and NEH region. Lac production is highly labor intensive process and provides employment to both men and women dwelling in forest and sub-forest areas of these states. It is a highly remunerative crop, paying high economic returns to the farmers and also to foreign exchange of the country through its export. Lac is mainly produced in India, Thailand, Indonesia, parts of China, etc. India is the largest producer of lac in the world.

Lac production in India

At present only less than 5% 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 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 local weekly markets of different lac producing districts, the estimated national production of sticklac during 2016-17 was approximately 16,352 tons comprising *rangeeni* (6195 tons) and *kusmi* (10,157 tons) sticklac. Among the lac growing states, Jharkhand state ranks 1st followed by Chhattisgarh, Madhya Pradesh, West Bengal, Maharashtra and Odisha. These six states contribute more than 98 % of the national lac production (Figure 8). Contribution of Jharkhand in national lac production is about 55 % followed by Chhattisgarh (16 %), Madhya Pradesh (14%), West Bengal (6 %), Maharashtra (5 %) and Odisha (2 %). Among the different cropping season crops, *aghani* crop was ranked 1st with the contribution of 35 % followed by *jethwi* (27 %), *baisakhi* (19 %) and *katki* (19 %) in total lac production.



Table 5. Lac production in India during 2016-17 (in tons)*

Name of states / Districts	Name of lac crop/strain [@]						Total (% share)
	<i>Baisakhi</i>	<i>Katki</i>	<i>Rangeeni</i>	<i>Jethwi</i>	<i>Aghani</i>	<i>Kusmi</i>	
Jharkhand	430	304	734	3727	4465	8192	8926 (54.6)
Chhattisgarh	800	610	1410	503	780	1283	2693 (16.5)
Madhya Pradesh	1143	1010	2153	69	52	121	2274 (13.9)
West Bengal	85	680	765	45	170	215	980 (6.0)
Maharashtra	410	455	865	5	5	10	875 (5.4)
Odisha	20	11	31	138	185	323	354 (2.2)
Assam	65	40	105	0	0	0	105 (0.6)
Andhra Pradesh	50	35	85	2	1	3	88 (0.54)
Gujarat	10	2	12	5	5	10	22 (0.12)
Meghalaya	10	10	20	0	0	0	20 (0.09)
Uttar Pradesh	10	5	15	0	0	0	15 (0.13)
Total	3033	3162	6195	4494	5663	10157	16352 (100.0)

@Baisakhi: - Summer season crop of rangeeni; *Jethwi*: - Summer season crop of kusmi; *Katki*: - Rainy season crop of rangeeni; *Aghani*: - Winter season crop of kusmi;[§] Andhra Pradesh including Telengana; * See Annexure I for details.

In comparison to previous year, the production of *rangeeni* as well as *kusmi* crop was decreased by 18% and 9%, respectively. The decrease in production was comprised by the drastic fall of 25 % and 32 % for *jethwi* and *baisakhi* crops, respectively. However, an increase of 1% and 9% was observed in case of *katki* and *aghani* crops, respectively. Overall, the total lac production for the year 2016-17 has decreased by about 13 % in comparison to 2015-16. Lac production scenario in India during 2016-17 is presented in Table 5 and the top ten lac producing districts in the country are enlisted in Table 6. Share of different crops at national level is presented in Figure 9. Lac production in India during previous five years is depicted in Figure 10.

Table 6. Top ten lac producing districts in the country

District (States)	2015-16	Rank	2016-17	Rank
Ranchi (Jharkhand)	3190	1	2710	1
Simdega (Jharkhand)	2020	2	2115	2
Khunti (Jharkhand)	1610	3	1315	4
Gumla (Jharkhand)	1605	4	1336	3
Gondia (Maharashtra)	1100	5	655	9
Korba (Chhattisgarh)	1010	6	705	8
Seoni (Madhya Pradesh)	900	7	865	5
West Singhbhum (Jharkhand)	825	8	790	7
Balaghat (Madhya Pradesh)	741	9	802	6
Kanker (Chhattisgarh)	705	10	470	10

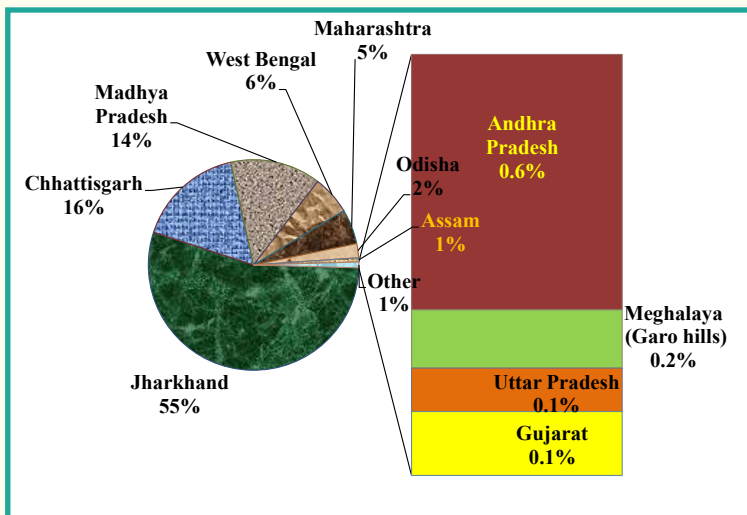


Figure 8. State-wise share in lac production during 2016-17

The overall, production of the lac in the country has been estimated to be 16,352 tons which is lower than the previous year production (18,746 tons). During, current year 2016-17, the lac production tends to be the average production (17278 tons) during last forty years. It is interesting to mention that the production level of lac is sustained from the lowest level of 9,035 tons during 2010-11 to 16,352 tons (about 80 % higher) during 2016-17. It reached up to the highest level of 21,008 tons in 2013-14. District wise lac production statistics and major lac producing areas in the country have been presented in Annexure I and Annexure II, respectively.

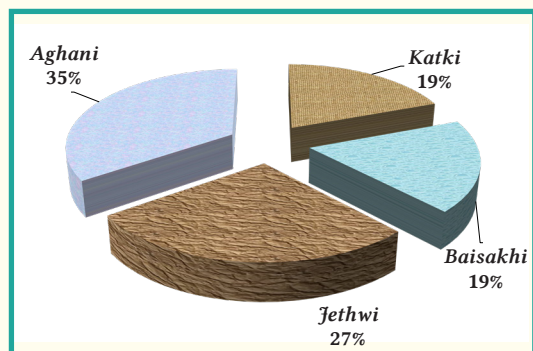


Figure 9. Crop-wise share in total lac production during 2016-17

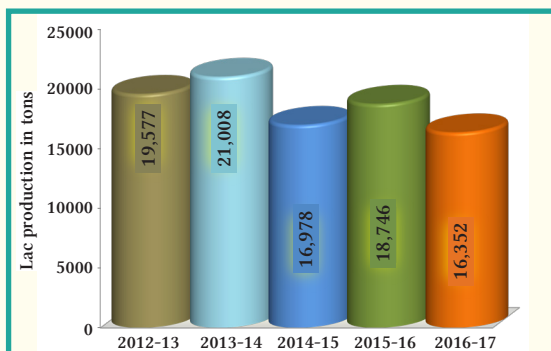


Figure 10. Lac production in India during previous five years

Lac processing and value addition in India

Lac growers sell the sticklac or scraped lac in small quantity or lots in the rural weekly markets (*haats*). 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). Progressive lac growers, nearer to lac processing units sell their produce directly to processors. Subsequently, collection of scraped lac in the course of the market day, the *paikars* sell it to the wholesaler in the same market or nearby processing centers in bigger lots. Finally the wholesalers also sell their purchase to processor. Further, processed and value added products of lac supplied to domestic as well overseas firms for various industrial applications. Different lac processing centers in the country and amount of sticklac processed during 2016-17 have been presented in Table 7 and Table 8, respectively.

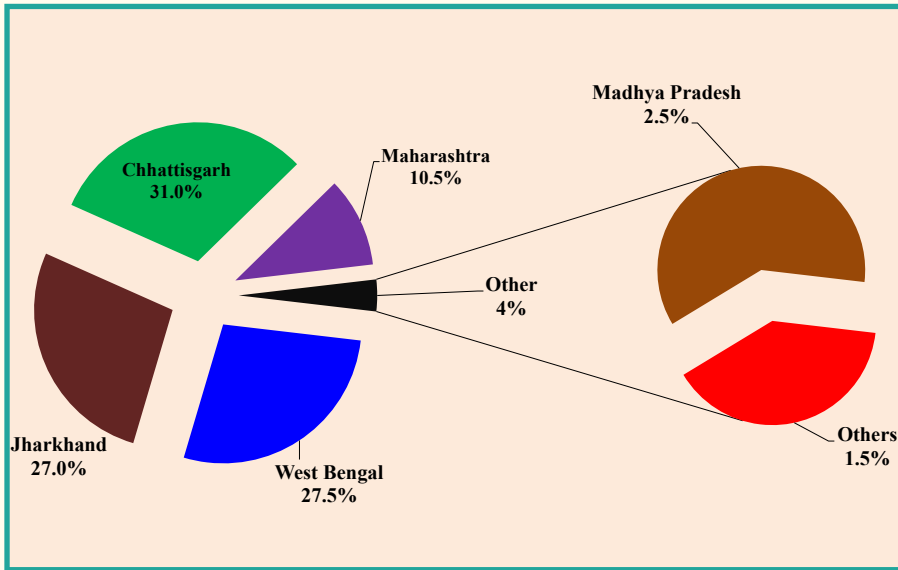


Figure 11. States-wise share in lac processing during 2016-17

On the basis of surveys conducted at different lac processing centers in the country, the total quantity of sticklac processed during 2016-17 was 16978 tons which also included the imported as well as previous years carry over stock in India. Information about share of different states in lac processing is presented in Figure 11 and amount of lac processed in India during previous five years is depicted in Figure 12. A total 182 lac processing units were functional in West Bengal (114), Chhattisgarh (31), Jharkhand (15), Maharashtra (6) and Madhya Pradesh (6) during the year 2016-17. In the processing of lac across the country, Chhattisgarh (31 %), West Bengal (28 %) and Jharkhand (27 %) shared about 86 % followed by Maharashtra (10 %), Madhya Pradesh (2.5%) and others (1.5%). There were 9 primary and 6 secondary markets existing at national level, in which annual arrival of sticklac was more than 500 tons.

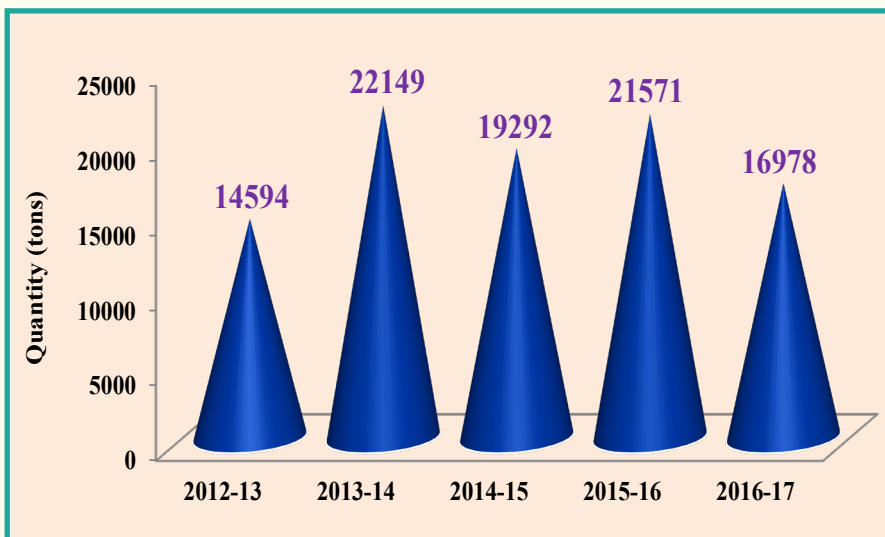


Figure 12. Lac processing in India during last five years


Table 7. Major lac processing centers in India during 2016-17

States	Districts /Centres	No. of processing units	Products made
Chhattisgarh	Dhamtari	15	Seedlac, Button lac, Bleached lac, Aleuritic acid
	Janjgir-Champa	5	Seedlac, Shellac, Bleached lac, Dewaxed Shellac, Lac dye
	Kanker	2	Seedlac
	Korba	7	Seedlac, Shellac, Bleached lac, Button lac
	Rajnandgaon	1	Seedlac, Shellac
	Raipur	1	Bleached lac, Aleuritic acid
Jharkhand	Daltonganj	2	Seedlac
	Ranchi and Khunti	9	Seedlac, Button lac, Shellac, Lac dye, Bleached lac
	Simdega	2	Seedlac
	Saraikela-Kharsawan	1	Bleached lac
	West Singhbhum	1	Black Shellac
Madhya Pradesh	Indore	1	Seedlac, Bleached lac, Varnish
	Balaghat	2	Seedlac
	Seoni	2	Seedlac
	Hosangabad	1	Seedlac
Maharashtra	Gondia	6	Seedlac, Shellac, Gasket Shellac Compound, Bleached lac
West Bengal	Purulia	93	Seedlac, Shellac, Button lac, Bleached lac, Aleuritic acid, lac wax, Dewaxed Decolourised lac
	North 24 Paragana	1	Aleuritic acid
	Others	20	Lac based value added products
Others		10	Lac based value added products
TOTAL		182	



Table 8. Quantity of sticklac processed in India during 2016-17

States	Districts/ Centres	Quantity processed (tons)	% change over last year
Chhattisgarh	Dhamtari	1410	41.0
	Janjgir-Champa	1720	36.0
	Kanker	220	120.0
	Korba	1740	28.9
	Rajnandgaon	180	80.0
	Sub total	5270	38.1
Jharkhand	Daltonganj	45	125.0
	Ranchi	203	915.0
	Khunti	4126	28.9
	Saraikela-Kharsawan	60	100.0
	Simdega	100	-71.4
	West Singhbhum	60	100.0
	Sub total	4594	25.9
Maharashtra	Gondia	1776	24.2
Madhya Pradesh	Indore	90	200.0
	Balaghat	70	16.7
	Seoni	150	87.5
	Hoshangabad	70	133.3
	Sub total	380	90.0
West Bengal	Purulia	3630	-53.3
	North 24 Paragana	350	-12.5
	Others	730	-35.5
	Sub total	4710	-49.4
Others	Odisha, Karnataka, Uttar Pradesh, Delhi, Tamil Nadu, etc.	248	-35.2
	Total	16978	-9.6

Table 9. Markets with annual arrival of over 500 tons

States	Primary markets	Secondary markets
Chhattisgarh	Bhaisama Bazar	Dhamtari, Kathgora and Sakti
Jharkhand	Tapkara, Bandgaon, Jaldega and Kolebira	Khunti
Maharashtra	Barghat region	Gondia
West Bengal	Balarampur, Jhalda and Tulin	Balarampur

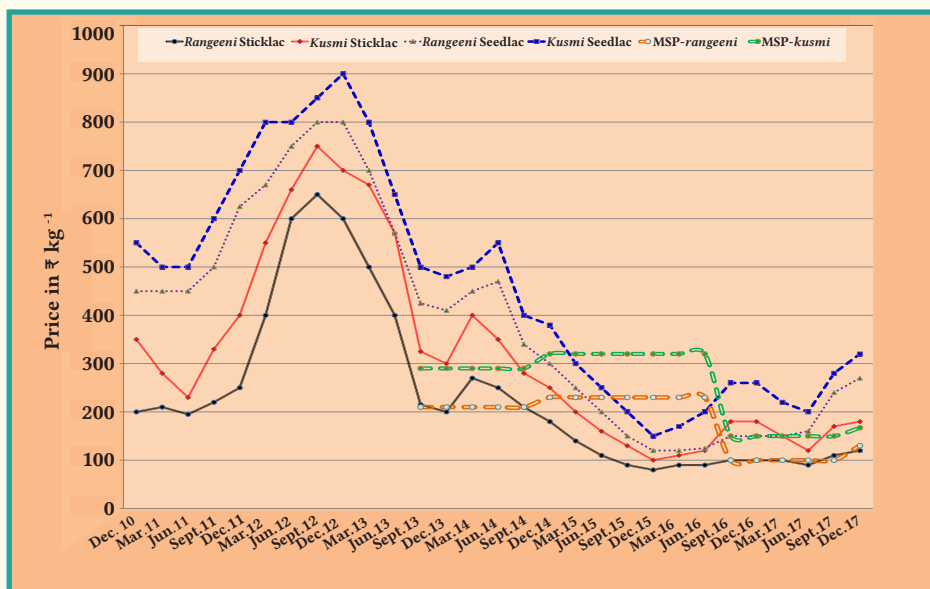
Name of the primary and secondary markets with annual arrival of over 500 tons and district wise distribution of lac processing centres across major lac producing districts of India have been presented in Table 9 and Table 10, respectively.


Table 10. Lac processing centers in the major lac producing districts of India

Classifications (Qty. in tons)	No. of districts	No. of processing centers	Name of the districts
> 1,000	6	134	Khunti, (Jharkhand); Janjgir-Champa, Dhamtari and Korba (Chhattisgarh); Gondia (Maharashtra) and Purulia (West Bengal).
100-1000	6	29	Kanker and Rajnandgaon (Chhattisgarh); Ranchi and Simdega (Jharkhand); North 24 Paragana (West Bengal) and Seoni (Madhya Pradesh) and other districts (West Bengal).
1- 100	7	9	Palamu, Saraikela-Kharsawan, West Singhbhum (Jharkhand); Raipur (Chhattisgarh); Indore, Balaghat and Hoshangabad (Madhya Pradesh)
< 1	7	10	Rest of the districts in Assam, Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Meghalaya, Odisha, Uttar Pradesh, Telangana and West Bengal.
Total	26	182	

Trends in price of lac over the time

Time series data on prices of *rangeeni* and *kusmi* sticklac and seedlac was collected from the above mentioned lac markets of Jharkhand, West Bengal, Chhattisgarh, Maharashtra and Madhya Pradesh on quarterly basis.


Figure 13. Trends in price of sticklac and seedlac over the time

The prices of *rangeeni* and *kusmi* sticklac as well as seedlac has shown increasing trend from December, 2010 to December, 2012. TRIFED launched a mega scheme to safeguard the interest of the forest dwellers by providing Minimum Support Price (MSP). Subsequently, market price also started to rise up from December 2015 from its lowest level. In comparison of this scenario, it is evident from the Figure 13 that local market price of lac improved significantly till December 2017.





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 2016-17 was 7240.78 tons which was valued ₹ 206.89 crores. Details of export in quantity and value, list of top importing countries of Indian lac and export of lac has been presented in the Table 11 and Table 12 while direction of the trade, the trend in export of lac in quantity and value during last seven years and share of different items of lac export value from India are shown in Figure 14, Figure 15 and Figure 16, respectively.

Among the export destinations of lac and its value added products Bangladesh (21.3%), USA (15.3%), Pakistan (12.4%), China (9.5%) Germany (8.5%) and Switzerland (7.2%) remained top destinations with more than 70% import from India. Iraq (3.7%), Egypt (3.1%), UK (2.7%) Indonesia (2.7%) and Italy (2.5%) and Spain (2.4%) were the other destinations for Indian lac.

Table 11. Export of lac and its value added products from India during 2015-17

Name of product	Export in 2015-16		Export in 2016-17	
	Quantity (tons)	Value (₹ lakh)	Quantity (tons)	Value (₹ lakh)
Shellac	2350.99	6737.50	3273.16	8556.63
Aleuritic acid	168.50	3669.51	151.76	2658.47
Seedlac	3091.06	6225.18	3151.45	6109.3
Dewaxed shellac	150.57	775.23	274.81	1268.07
Bleached lac	225.34	1275.90	385.06	2068.67
Shellac wax	14.20	64.21	4.49	28.7
Buttonlac	1447.81	4882.32	0.00	0.00
Dewaxed decolourised	2.55	21.24	0.00	0.00
Gasket lac	6.48	16.50	0.00	0.00
Lac dye	0.01	0.51	0.00	0.00
Dewaxed bleached shellac	125.63	809.20	0.00	0.00
Garnet shellac	17.17	54.23	0.00	0.00
Dewaxed garnet shellac	48.13	112.99	0.00	0.00
Shellac(kiri)	0.00	0.00	0.00	0.00
Stick lac	0.00	0.00	0.05	0.08
Waxy bleacedlac	20.00	110.66	0.00	0.00
Total	7668.42	24755.18	7240.78	20689.92


Table 12. Top importing countries of Indian lac during 2016-17

Country	Quantity (tons)	Value (US \$ Millions)	% Share
Bangladesh Pr	1482.68	5.99	19.4
Pakistan Ir	1247.71	4.08	13.2
U SA	863.33	3.85	12.5
Germany	780.95	3.02	9.8
China P Rp	633.43	2.73	8.9
Switzerland	79.50	1.89	6.1
Spain	150.10	1.31	4.3
Iraq	384.50	1.24	4.0
Italy	191.30	0.84	2.7
U K	130.80	0.82	2.7
Indonesia	241.13	0.81	2.6
Thailand	248.50	0.73	2.4
Egypt A Rp	216.00	0.66	2.1
France	60.21	0.38	1.2
Japan	65.50	0.27	0.9
Canada	69.88	0.19	0.6
Others (43)	395.27	2.04	6.6
Total	7240.78	30.86	100.00

Lac is an important natural resins exported by and also imported from Indonesia, Thailand, *etc.* in India. During 2016-17, exported value showed that 99.94 % contribution in natural resins export were from lac (98.18 %), other resins (0.91 %) and gum rosin (0.85 %).

Table 13. Export of lac during XI and XII Plans periods

Year	Quantity (tons)	Value (₹ lakh)
XI Plan		
2007-08	7906.33	12426.87
2008-09	6968.42	12414.50
2009-10	6422.61	11002.33
2010-11	6339.05	21112.92
2011-12	6858.21	36461.30
XII Plan		
2012-13	4361.30	48027.58
2013-14	8158.10	56853.63
2014-15	6569.17	32249.58
2015-16	7668.42	24755.18
2016-17	7241.00	20690.00





Average annual export quantity of lac during last ten (2007-08 to 2016-17) years was 6,849.26 tons valued ₹27599.39 lakh. Average annual demand of lac was 6,799.60 tons valued ₹36515.19 lakh during the period 2012-13 to 2016-17.

However, during last 15 years growth in exported quantity was negative for lac and total natural resins group as the sharp deceleration in quantity demanded in 2012-13. But, in value terms the same figure has got a momentum of the significant growth rate with a high stability coefficient.

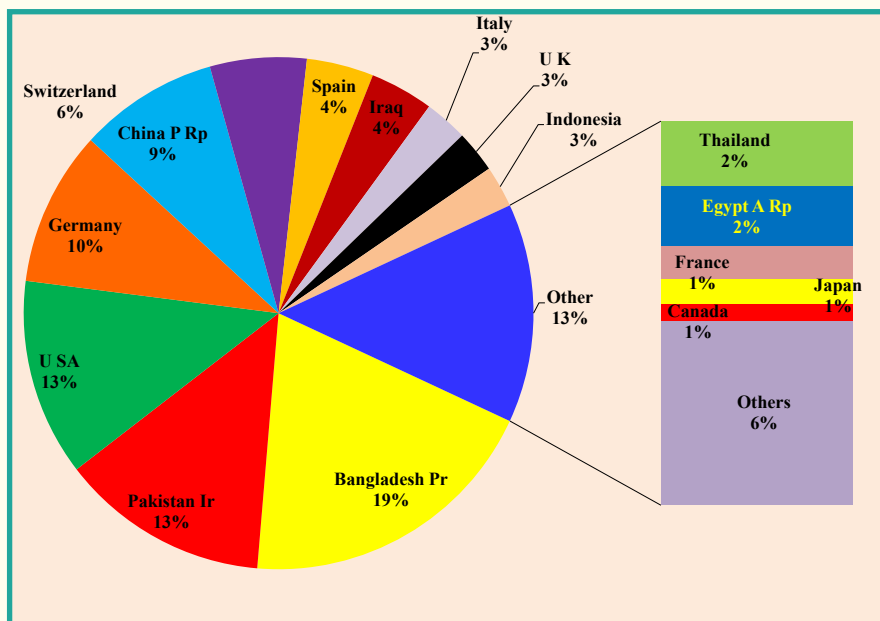


Figure 14. Direction of the trade of lac and its value added products

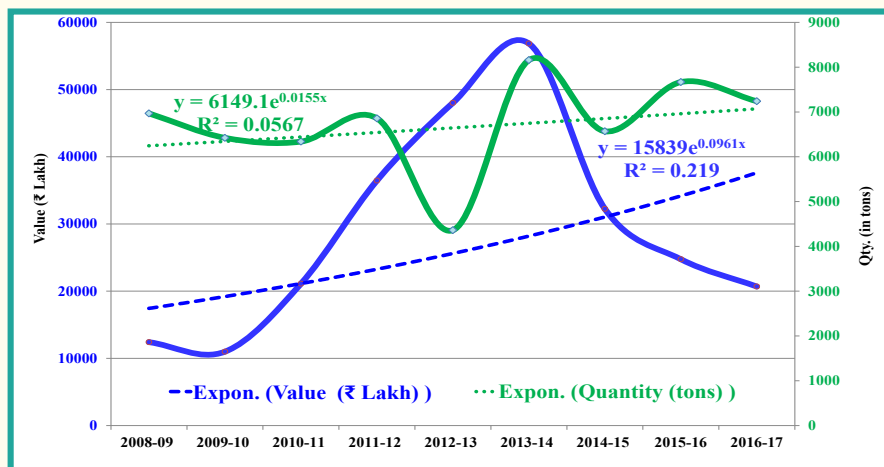


Figure 15. Trends in export of lac based products from India

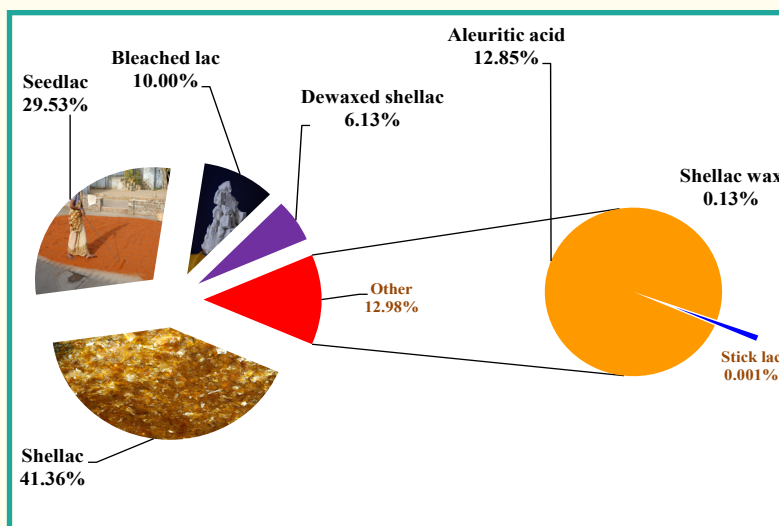


Figure 16. Product-wise export share of various lac based products

Pine resin –a flora based resin



Photo 2. Pine resin trees in forest

Pine resins are secretion of pine resins (*Pinus roxburghii* Sarg.), particularly coniferous trees. These are used in the production of varnishes, adhesives, and food glazing agents. *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 Himachal Pradesh, Uttarakhand, Jammu & Kashmir and north-eastern states. The northern hill states annually produce around 8,000 to 9,000 tons of raw rosin extracted from pine trees. Commercially tapped sources of pine resin are depicted in Table 14.

Table 14. Commercially tapped sources of pine resin: species and country of production

Sl. No.	Major 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	China
4	<i>P. massoniana</i> D. Don	China
5	<i>P. merkusii</i> Jungh. & Vriese	Indonesia, Vietnam
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

In sub-tropical India, pine forests are found in Bhutan, North India, Kashmir, Nepal, Pakistan, Sikkim, and southern part of Tibet with altitudes ranging between 400 and 2500 m (Naithani, 1984; Tewari, 1994). The hills of Uttarakhand, in the northern India are one of the best habitats of chir pine forests. Five species of pines are indigenous to India viz. *P. roxburghii* (Chir pine), *P. wallichiana* (Blue pine), *P. kesiya* (Khasi pine), *P. gerardiana* (Chilgoza pine) and *P. merkussi* (Teriasserian pine) (Gamble, 1902). Out of these *P. roxburghii*, *P. wallichiana* and *P. gerardiana* are found in the Himalayas, whereas *P. kesiya* and *P. merkussi* are indigenous to Assam (India), China and Burma.

Major share of resin production comes from Himachal Pradesh and Uttarakhand. The production of resin in the states during the year 2016-17 was about 6000 tons and more than 85 % of this raw material is processed in the Rosin and Turpentine oil Factories (RTFs). Indonesia also supplies rosin to Indian industries but China is the major supplier. Indonesian rosin costs around the same as the Chinese product. Both China and Indonesia have captured more than 50% of the Indian market. After the global recession, China had dropped its prices in the Indian market. The annual requirement of rosin in the country was 40,000-50,000 tons.

Pine resin production

China and Indonesia were leading producers of pine resin followed by India. Total worldwide production of rosin, which is made up of resin extracted from pine, was about 1.2 million tons per annum in 1995 (FAO). Of this total about 60% was gum rosin (Coppen and Hone, 1995). As per FAO reports (Coppen and Hone, 1995), crude resin production in India peaked at about 75000 tons in 1975-76 and has since fallen steadily. Production in 1990-91 was less than 25000 tons. The main reason for the decline was the loss of trees for tapping, either because many of them had reached the end of their productive lives and there were no new areas of pine with which to replace them, or because the damage done to trees by the use of inefficient, incorrectly applied methods of tapping led to Forest Department bans on tapping. Oleoresins from pines are composed of two components, volatile turpentine oil and the remaining solid transparent material called as Rosin. The greatest single use of turpentine in India is for the production of synthetic camphor. In India, Resin yield varied between 4 and 7 kg per tree. In India resin production and its value during 2007-08 to 2016-17 is depicted in Figure 17.

Resin production policy

In Uttarakhand (earlier known as Uttar Pradesh) the tapping of resin began in 1890 that was commercialized in 1896. It was extended to Jammu and Kashmir and Himachal Pradesh in 1940 and 1945 respectively (Singh and Asokan, 1984).

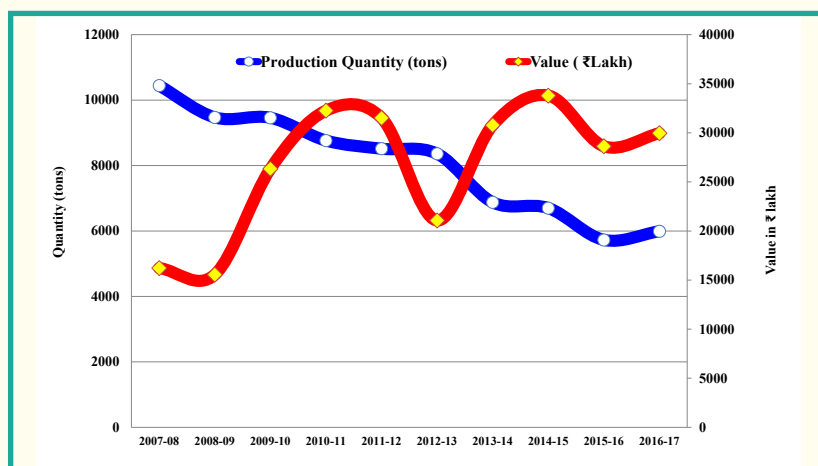


Figure 17. Pine resin production and its value in Himachal Pradesh and Uttarakhand



The old method used for resin tapping was the faulty French “cup and lip” method, which was replaced by the “rill” method (Kaushal and Khosla, 1984; Chaudhari *et al.*, 1988). For the Himalayan region, extraction of resin as a source of revenue is reported since year 1911 (Nautiyal *et al.*, 2006). State wise annual pine resin production and their contribution in the total production is given in Table 15 and graphical illustration presented in Figure 18.

Table 15. State wise annual pine resin production and their contribution in the total production

Year	Uttarakhand	Himachal Pradesh	Total
2007-08	1930 (18.5)	8514 (81.5)	10444 (100.0)
2008-09	1875 (19.8)	7596 (80.2)	9471 (100.0)
2009-10	1961 (20.7)	7500 (79.3)	9460 (100.0)
2010-11	1764 (20.1)	7000 (79.9)	8764 (100.0)
2011-12	1614 (19.0)	6900 (81.0)	8514 (100.0)
2012-13	1467 (17.5)	6894 (82.5)	8361 (100.0)
2013-14	1486 (21.6)	5389 (78.4)	6875 (100.0)
2014-15	1442 (21.5)	5258 (78.5)	6699 (100.0)
2015-16	1562 (27.3)	4164 (72.7)	5726 (100.0)
2016-17	1718 (28.69)	4273 (71.31)	5773 (100.0)
Average	1682 (20.94)	6349 (79.06)	8031 (100.0)

Figures in parentheses are the percentage of the total

Uttarakhand: To ensure transparency in allotment of resin to different agencies, resin policy has been formulated and issued in 2003.

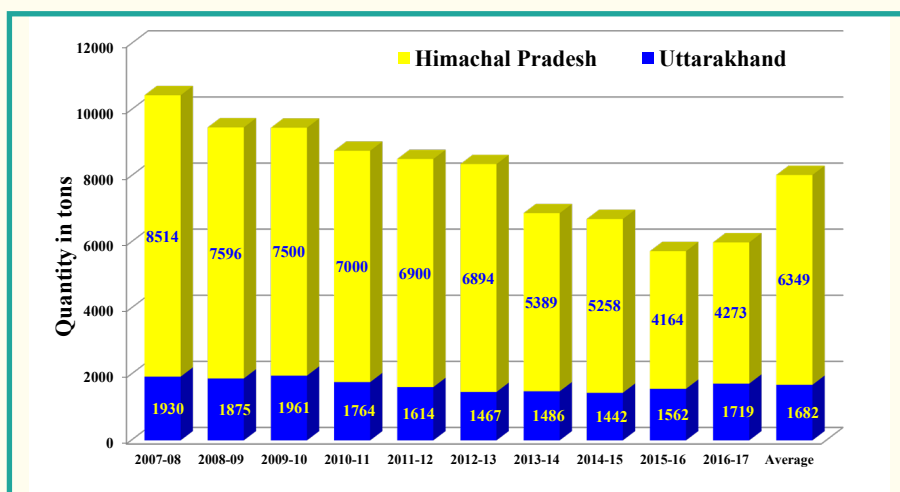


Figure 18. Pine resin production in Himachal Pradesh and Uttarakhand



Himachal Pradesh: The hill state annually produces around 6350 tons of raw rosin extracted from pine trees, grown mainly in lower hills of Hamirpur, Una, Mandi, Solan and Sirmaur districts. Exploitation of resin in the Pradesh is done by the Himachal Pradesh State Forest Corporation, Shimla. About 15.76 lakh blazes were handed over to H.P. State Forest Corporation for tapping during the year from state forests. The quantity have to be extracted by the Corporation was 58251 quintals for which the total royalty payable by the H.P. State Forest Corporation amounted to ₹10.25 Crore. As per decision of the Pricing Committee of Government of Himachal Pradesh, a rate of Rs. 65/- per blaze was fixed for the year.

Pine resin processing in India

The HP State Forest Corporation: The Himachal Pradesh State Forest Corporation functioned principally as a harvesting agency during the year. The entire exploitation works of timber, resin, fuel-wood, charcoal, *etc.* from the state forests were handled by the Forest Corporation. There are resin processing units functioning in private sector in Hamirpur Circle particularly in Una and Dehra Divisions and two in public sector at Bilaspur and Nahan. But, it should also be noted that potential production value is probably higher than the estimated one because only a minor part of potential pine forests are used for resin tapping.

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 16.

Table 16. 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

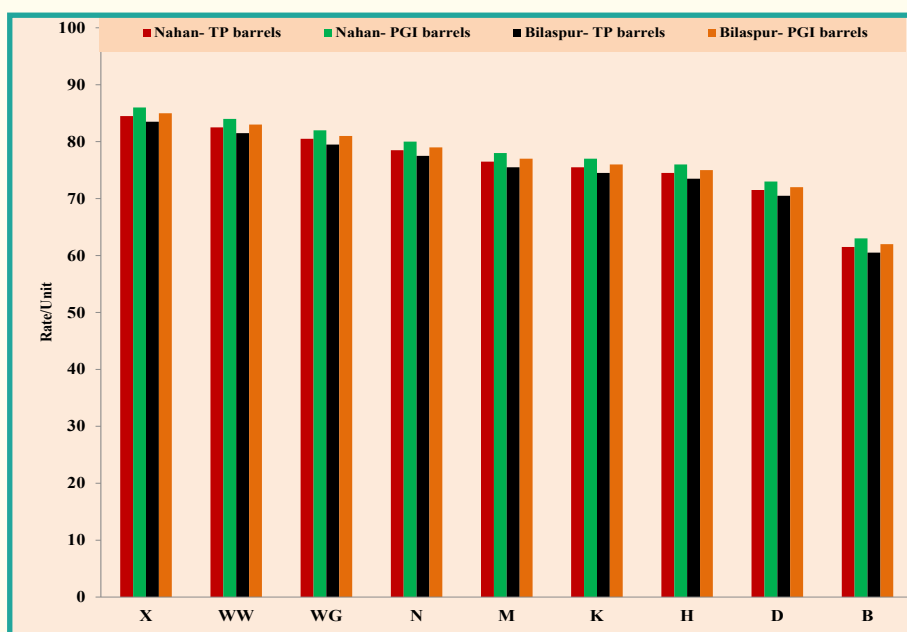
The two Resin & Turpentine Oil Factories, located at Bilaspur and Nahan operational since four decades, have both skilled and unskilled workers to undertake resin processing and other diversification activities. Rosin and turpentine oil and other subsidiary products like phenyl, varnish, black japan, *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.

Pine resin market and price

Rosin is purchased on the basis of its colour, which varies from pale amber to black. The lighter the colour of rosin, the more valuable it is.


Table 17. Grade-wise price of rosin during 2016-17

Rosin Category	Grade	Full name	Rate (₹/Kg)			
			Nahan-TP barrels	Nahan-PGI barrels	Bilaspur-TP barrels	Bilaspur-PGI barrels
Pale	X	Extra White	84.5	86	83.5	85
	WW	Water White	82.5	84	81.5	83
	WG	Window Glass	80.5	82	79.5	81
	N	Nancy	78.5	80	77.5	79
Medium	M	Mary	76.5	78	75.5	77
	K	Kitty	75.5	77	74.5	76
	H	Harry	74.5	76	73.5	75
Dark	D	Dark	71.5	73	70.5	72
	B	Black	61.5	63	60.5	62


Figure 19. Price pattern of various grades of Pine resin based products

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 ₹ 61.5 to ₹ 86. The price of per kilogram rosin is given in Table 17 and graphically shown in Figure 19. This price is an ex-factory price including packing charges excluding taxes and duties *etc.*

International trade of pine resin

Details of export in quantity and value, list of countries importing resin from India and details of resin supply from various countries during 2016-17 is presented in the Table 18. The total export of rosin during the year 2016-17 was 142.64 tons which was valued ₹179.71 lakh. Similarly, total import of rosin during the year 2016-17 was 43098.06 tons which was valued ₹39591.02 lakh. The analysis of



EXIM data revealed that the exported quantity of rosin decreased to 30.2% in 2016-17 in comparison to 2015-16 while imported quantity of rosin was increased by 2.70% in 2016-17 in comparison to 2015-16. During this year in international market, export price of rosin decreased by 15.13 %, and import price decreased by 12.98 % comparatively of previous year. Demand of resin was higher than the quantity processed in India. Hence, India depends on Brazil, Indonesia, Nepal, China and Vietnam to meet its domestic demand. About 99 % of gum rosin was supplied from these four neighboring countries of Asia. Similarly, about 95 % gum rosin was demanded by the major buyers like Italy, Nigeria, Cote D' Ivoire, Portugal, Iran Sri Lanka U Arab Emts Kenya and Nepal.

The destination and source wise demand and supply of the rosin is depicted in the Figure 20 and Figure 21. Rosin is an important natural resin in the basket of import items.

Table 18. Destination and source wise trade scenario of rosin during 2016-17

Country	Quantity (tons)	Value (₹ lakh)	Value (000 US \$)	Share (%)
A. Export				
Italy	57.00	56.52	80.00	31.45
Nigeria	25.00	35.60	50.00	19.81
Cote D' Ivoire	20.00	31.14	50.00	17.33
Portugal	16.00	16.73	30.00	9.31
Iran	6.00	8.98	10.00	5.00
Sri Lanka Dsr	6.00	7.53	10.00	4.19
U Arab Emts	5.04	6.56	10.00	3.65
Kenya	3.36	6.26	10.00	3.48
Nepal	1.00	5.17	10.00	2.88
U S A	1.70	3.20	4.51	1.78
Ethiopia	0.50	0.50	1.40	0.28
Zambia	0.25	0.50	0.70	0.28
Bangladesh Pr	0.40	0.47	1.12	0.26
Saudi Arab	0.25	0.46	0.70	0.25
Others (3)	0.14	0.09	0.40	0.05
Total	142.64	179.71	268.83	100.00
B. Import				
Brazil	13,146.10	12,277.30	18300.00	31.01
Indonesia	12,657.82	11,812.72	17610.00	29.84
Nepal	12,973.29	10,329.47	15410.00	26.08
China P Rp	2,125.33	2,970.19	4430.00	7.50
Vietnam Soc Rep	1,923.22	1,697.84	2530.00	4.29
Belgium	81.25	241.46	360.00	0.60
Japan	48	117.7	170.00	0.30
Others (5)	143.1	144.3	212.6	0.38
Total	43098.06	39591.02	59022.64	100.00

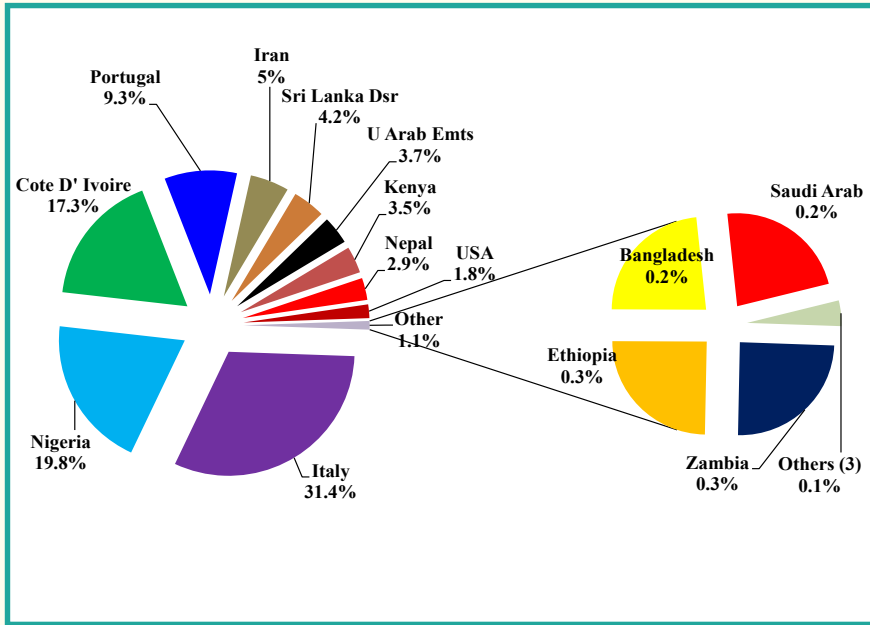


Figure 20. Destination wise scenario of rosin during 2016-17

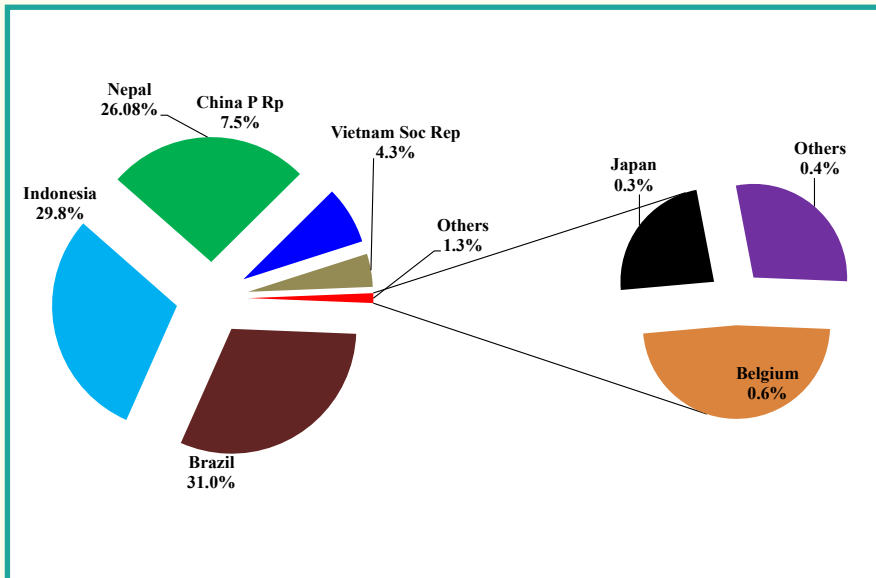


Figure 21. Source wise scenario of rosin during 2016-17

Copal

Copals are derived from species of *Bursera*, *Protium* (*Burseraceae*) and *Hymenaea* and have adhesive property. It is evident from Table 19 that more than 99% of the copal in India was supplied from Indonesia (97.56%) and Philippines (2.31%) during 2016-17. A very little portion of the total imported quantity was exported to Egypt during 2016-17, but it was nil in 2015-16.

Table 19. Destination and source wise trade scenario of copal during 2016-17

Country	Quantity (tons)	Value (₹ lakh)	Value (000' US dollars)	% share
Export				
Egypt A Rp	2.00	1.08	1.61	100.00
Total	2.00	1.08	1.61	100.00
Import				
Indonesia	1769.97	1290.70	1920.00	97.56
Philippines	68	30.57	50.00	2.31
Spain	0.05	1.67	2.00	0.13
Total	1838.02	1322.93	1972.00	100.00

Dammar batu

Damar is tapped from the *sal* tree (*Shorea robusta*). Annual production of Dammar batu in India is about 80-100 tons and used as painting and incense material. Destination wise EXIM scenario of dammar batu during 2016-17 is given in Table 20. During 2016-17, more than 95% of this resin in India was supplied from Indonesia (56.32%) and Thailand (41.51%). A very little portion of the total imported quantity was exported to Jordan (80.99%), Ethiopia (12.19%) and Germany (6.22%).

Table 20. Destination wise trade scenario of dammar batu during 2016-17

Country	Quantity (tons)	Value (₹ lakh)	Value (000' US dollars)	Share (%)
Export				
Jordan	5.00	9.37	13.99	80.99
Ethiopia	0.50	1.41	2.10	12.19
Germany	0.25	0.72	1.07	6.22
Sri Lanka Dsr	0.05	0.07	0.00	0.61
Italy	0.01	0.01	0.01	0.09
Total	5.81	11.57	17.18	100.00
Import				
Indonesia	10810.25	2904.46	4335.01	56.32
Thailand	3474.15	2140.37	3194.58	41.51
Vietnam Soc Rep	169.26	76.62	114.36	1.49
Lao Pd Rp	15.00	16.99	25.36	0.33
China P Rp	40.32	15.36	22.93	0.30
Malaysia	13.00	2.99	4.46	0.06
Total	14521.98	5156.79	7696.70	100.00



Mastic gum

This is the dried exudate of the shrub-like tree *Pistacia lentiscus L. var. chia* of the *Anacardiaceae* family, cultivated exclusively in the south of the Greek island Chios. It has the application in dentistry, photographic negatives and paints industry.

Table 21. Destination wise trade scenario of mastic gum during 2016-17

Country	Quantity (tons)	Value (₹ lakh)	Value (000' US dollars)	Share (%)
Export				
Sri Lanka Dsr	0.14	0.12	0.18	100.00
Total	0.14	0.12	0.18	100.00
Import				
Greece	3.65	19.96	29.79	98.23
U Arab Emts	0.10	0.36	0.54	1.77
Total	3.75	20.32	30.33	100.00

Mastic gum is shown to exert beneficial effects on a wide range of human disorders. The most comprehensive data so far has indicated that mastic gum provides protection against gastrointestinal malfunctions and bacterial infections. In India, it is imported from Greece (98.23%) and UAE (1.77%). A little quantity (140 kg@₹85/kg) was imported by Sri Lanka (Table 21).

B. NATURAL GUMS

Plant exudate based natural gums



Photo 3. Natural gum: Babool gum (*A. nilotica*)

Data and information was collected from the major collection centers like Nagpur, Bilaspur, Surat, Ajmer and Delhi. Procurement data available with Odisha Forest Development Corporation Ltd, Rajasthan Tribal Areas Development Coop Federation Ltd, Maharashtra State Cooperative Tribal Development Corporation Ltd, Jharkhand State Minor Forest Produce Cooperative Development Marketing Federation Ltd, 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 was recorded and compiled. 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 rate fixed by the Govt. After making the payment of the collection charges 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. In India, mainly *karaya* gum (*S. urens*), *dhawada* gum (*A. latifolia*), *prosopis* gum (*P. juliflora*), *khair* gum (*A. catechu*), *babool/babul* gum (*A. nilotica*), *Jhingan* (*Lannea coromandelica*), *palas* (*B. monosperma*), *char* (*B. lanzan*) and *guggul* gum (*C. wightii*) are produced.

Exudate gums possess a unique combination of functionalities and properties. Importantly, these biopolymers are eco-friendly as they are biodegradable. The state wise gum production during 2007-08 to 2016-17 is shown in Table 22 and graphical illustration is shown in Figure 22.

About 80 % of gum production in the country is contributed by Maharashtra (37.3 %), Madhya Pradesh (18.4 %), Jharkhand (11.1 %), Telengana (6.6 %), and Chhattisgarh (5.7 %). Rest of the 20 % comes from



Gujarat (4.2 %), Andhra Pradesh (3.4%) and other minor gum producing states (13.2%). District wise gum producing areas in the country are presented in Annexure III. In parts of the Jaipur, Ajmer and Jodhpur districts *A. senegal* is common. *A. catechu* forests are common in the south-eastern regions. e.g. Baran, Jhalawar, Kota, Tonk , Chittorgarh and Alwar.

Table 22. Gum production in major gum producing states of India (in tons)

Year	Maharashtra	Madhya Pradesh	Jharkhand	Telangana	Chhattisgarh	Gujarat	Andhra Pradesh	Others	Total
2007-08	0.0	23.5	0.0	307.8	138.3	0.0	107.8	0.0	577.4
2008-09	0.0	23.2	0.0	200.3	142.4	28.0	75.1	5.0	474.0
2009-10	0.0	8.7	0.0	175.6	236.9	47.2	35.1	6.4	509.9
2010-11	200.0	286.5	240.6	99.7	41.6	27.9	24.0	103.0	1023.2
2011-12	203.4	292.3	270.4	159.6	20.3	33.6	34.5	134.6	1148.6
Average	80.7	126.8	102.2	188.6	115.9	27.3	55.3	49.8	746.6
2012-13	350.8	232.4	207.3	102.2	23.6	42.6	29.9	155.2	1144.0
2013-14	539.1	207.5	90.0	65.0	2.5	54.7	42.5	143.0	1144.4
2014-15	323.8	120.0	56.0	42.5	4.0	51.5	26.2	87.0	710.9
2015-16	221.0	113.0	56.3	33.6	139.0	16.1	19.8	85.0	683.8
2016-17	158.0	113.0	64.0	40.0	73.0	16.1	10.3	95.0	569.3
Average	318.5	157.2	94.7	56.7	48.4	36.2	25.7	113.0	850.4

Note: These are the revised dataset and may differ a little with the previous estimates due to validation and updates

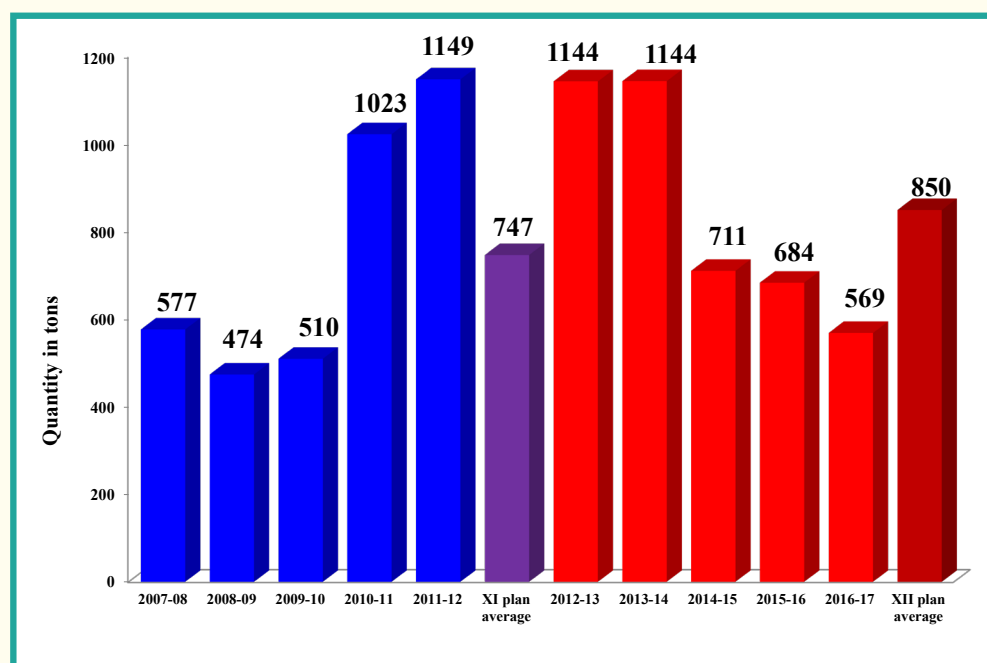


Figure 22. Quinquennial comparison of the production of natural gums in India



Gum *karaya* (*Sterculia urens*)

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

Gum *karaya* is the dry exudate of *S. urens* and *S. villosa*. It is also 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 including pharmaceutical, food, paper, textiles, cosmetic industry, etc.

Karaya gum production in India

Overall production has decreased from 6838 tons in 1975–1976 to 94.1 tons in 2016-17. During this period the price increased from ₹7.4/kg to ₹110/kg. The gum production across various states has been presented in Table 23 and Figure 23.

Table 23. Karaya gum production in major gum producing states of India (in tons)

State / Year	Telangana	Chhattisgarh	Andhra Pradesh	Madhya Pradesh	Jharkhand	Maharashtra	Gujarat	Others	Total
2007-08	301.2	107.7	70.4	23.5	0.0	0.0	0.1	5.0	507.8
2008-09	194.6	86.4	44.6	23.2	0.0	0.0	0.1	5.0	353.9
2009-10	173.6	175.0	22.9	8.7	0.0	0.0	0.1	6.4	386.8
2010-11	98.5	39.0	16.6	6.5	0.0	0.0	0.1	3.0	163.6
2011-12	157.3	13.9	24.8	12.2	49.4	23.2	0.2	4.0	284.9
Average	185.0	84.4	35.9	14.8	9.9	4.6	0.1	4.7	339.4
2012-13	101.6	19.1	16.3	8.2	51.5	10.0	0.2	5.0	211.9
2013-14	64.4	1.8	27.9	12.1	4.4	13.0	0.1	5.0	128.8
2014-15	39.0	4.0	16.0	10.0	4.0	5.0	0.2	5.0	83.2
2015-16	30.1	41.0	9.9	5.0	2.3	7.0	0.1	5.0	100.4
2016-17	35.0	21.0	4.1	8.0	2.0	8.0	0.1	5.0	83.2
Average	54.0	17.4	14.9	8.7	12.8	8.6	0.1	5.0	121.5

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 seven years in India is illustrated in Figure 24.

Collection and grading of *karaya* gum

During 2016-17, a Minimum Support Price (MSP) of ₹10800 per qt for *karaya* gum was declared by Pricing Cell, TRIFED, Ministry of tribal affairs, Govt. of India.



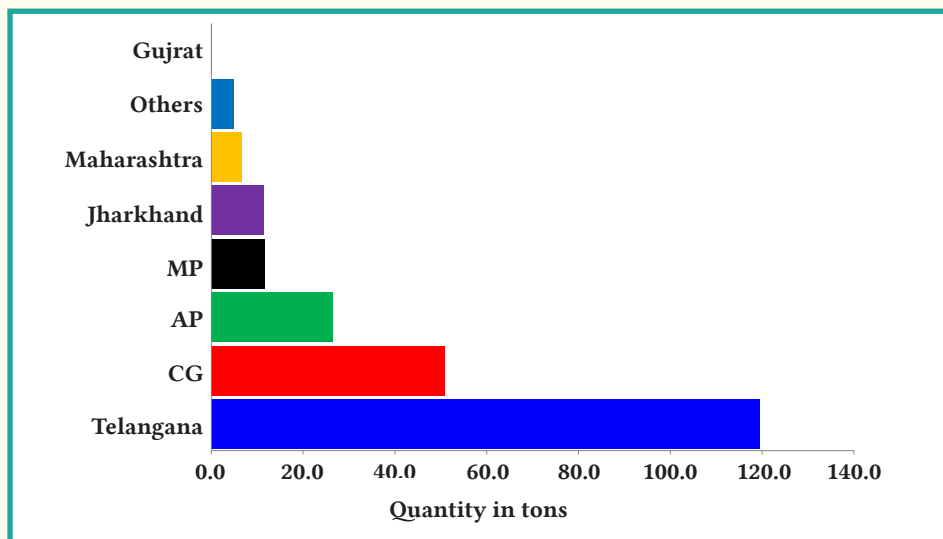


Figure 23. State-wise average production of karaya gum (2007-08 to 2016-17)

However, prevailing market price of gum *karaya* is ranged from ₹350 (Delhi) to ₹400 (Tamil Nadu). The scheme is initially being implemented in the states having scheduled areas and scheduled tribes in the fifth schedule of the Constitution of India (except Himachal Pradesh). Now, it is extended over the country.

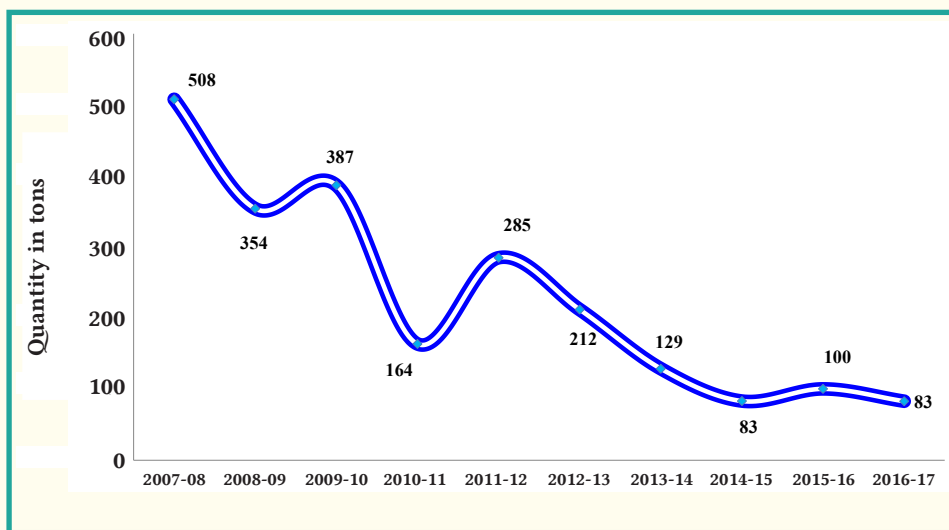


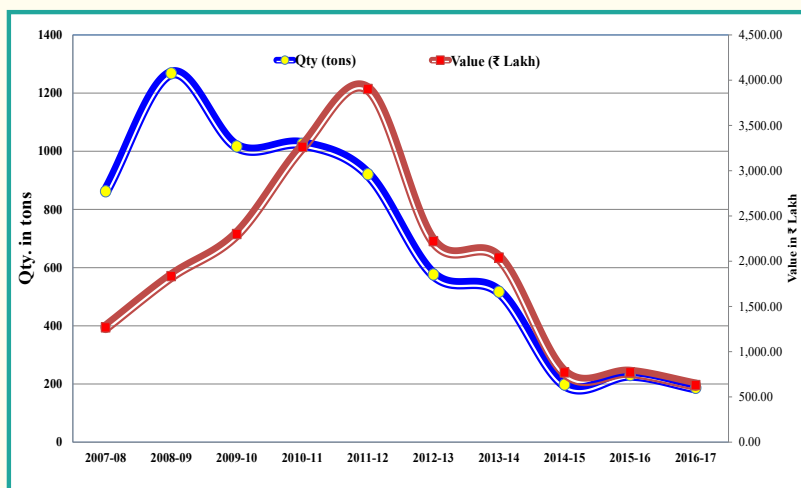
Figure 24. Trends in production of gum karaya in India

International trade of *karaya* gum

Export of gum *karaya* from India during previous years have been depicted in Figure 25 while domestic demand from and overseas supply in India have been given in Table 24. Japan (41.01 %), France (12.07 %), Switzerland (8.87%), USA (5.99%), Malaysia (4.94%), Germany (3.75%) Spain (3.64%), Pakistan (3.54 %), Hongkong (2.85%) and Syria (1.88%) remained as major export destinations during 2016-17. A total of 912.55 tons of gum *karaya* was supplied from Mali (56.03%), Senegal (37.93%), USA (6.03%) and Malaysia (0.01%) to India. Source wise import figures are presented in Figure 27.


Table 24. Export and import of gum *karaya* during 2016-17

Country	Quantity (tons)	Value (₹ lakh)	Value (000' US dollars)	Share (%)
A. Export				
Japan	56.00	258.42	390.00	41.01
France	40.00	76.04	110.00	12.07
Switzerland	21.20	55.90	80.00	8.87
U S A	11.23	37.74	60.00	5.99
Malaysia	10.47	31.14	50.00	4.94
Germany	5.00	23.66	40.00	3.75
Spain	5.20	22.92	30.00	3.64
Pakistan Ir	5.80	22.33	30.00	3.54
Hong Kong	4.10	17.96	30.00	2.85
Syria	3.00	11.85	20.00	1.88
Vietnam Soc Rep	7.70	11.81	20.00	1.88
Myanmar	2.65	8.34	10.00	1.32
China P Rp	1.50	7.69	10.00	1.22
Jamaica	2.50	6.91	10.00	1.10
U Arab Emts	3.85	5.46	10.00	0.87
Others	6.70	31.93	65.00	5.07
Total	186.90	630.10	965.00	100.00
B. Import				
Mali	572.84	439.42	660.00	56.03
Senegal	336.70	297.44	450.00	37.93
U S A	2.99	47.29	70.00	6.03
Malaysia	0.02	0.08	1.20	0.01
Total	912.55	784.23	1181.20	100.00


Figure 25. Export of gum *karaya* from India

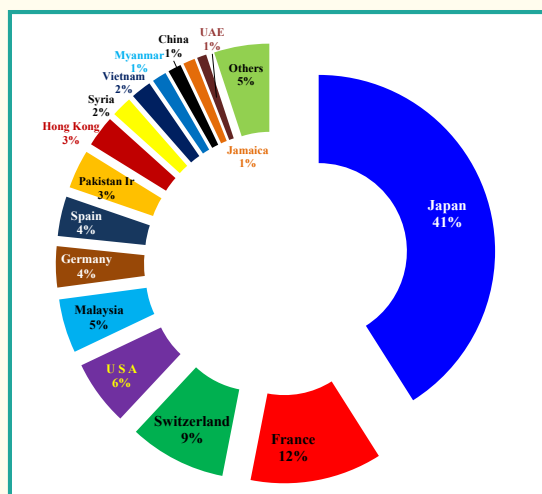



Figure 26. Destination wise scenario of gum karaya during 2016-17

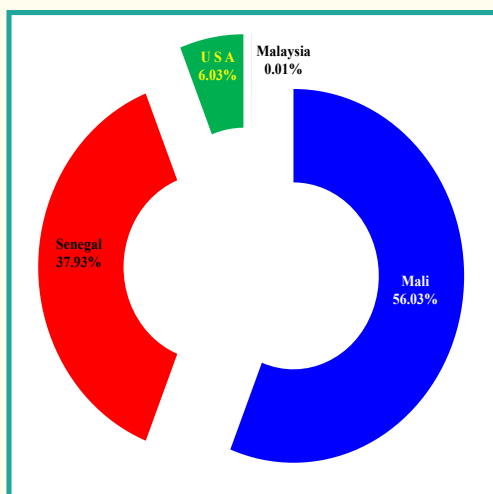


Figure 27. Source wise scenario of gum karaya during 2016-17

Dhawda gum/ Gum Ghatti (*A. latifolia*)

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. *Dhawda* gum is used as an emulsifier of petroleum and non petroleum waxes, flavour fixative, binder in long-fibered light weight papers and stabilizer in beverages and butter containing table syrups. It is used to prepare uniform and discrete prills of cross-linked polystyrene, drilling mud conditioner 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. State-wise production data have been shown in Table 25. It is evident from the Figure 28 that total production of *dhawda* gum increased from 40.7 tons in 2007-08 to 201.00 tons in 2016-17.

Table 25. *Dhawda* gum production in major gum producing states of India (in tons)

State / Year	Andhra Pradesh*	Chhattisgarh	Gujarat	Jharkhand	Madhya Pradesh	Maharashtra	Others	Total
2007-08	0.50	40.00	0.20	0.00	0.00	0.00	0.00	40.70
2008-09	0.60	39.30	0.20	0.00	0.00	0.00	0.00	40.10
2009-10	0.30	42.50	0.50	0.00	0.00	0.00	0.00	43.30
2010-11	0.80	1.60	0.30	0.00	0.00	0.00	0.00	2.70
2011-12	0.50	3.01	2.33	20.50	30.10	40.20	50.60	147.24
Average	0.54	25.28	0.71	4.10	6.02	8.04	10.12	54.81
2012-13	0.60	2.62	1.30	30.20	24.20	240.77	80.20	379.89
2013-14	0.80	0.20	1.40	25.40	20.80	334.11	65.70	448.41
2014-15	1.00	0.00	1.30	12.00	10.00	230.79	40.00	295.09
2015-16	1.00	6.00	1.00	4.00	8.00	134.00	40.00	194.00
2016-17	1.00	42.00	1.00	2.00	5.00	100.00	50.00	201.00
Average	0.88	10.16	1.20	14.72	13.60	207.93	55.18	303.68

*including Telengana



Collection and grading of *dhawda* gum

The collection rate for *dhawda* gum for the year 2016-17 was around ₹650-850/kg for Grade-I, ₹250-350/kg for Grade-II, ₹150-180/kg for Grade-III.

Gum *arabic* (*Acacia senegal*)

Gum arabic, also known as Acacia gum, is a natural gum made of the hardened sap of various species of the Acacia tree. Gum *arabic* is predominantly collected from two species of Acacia, namely *A. senegal* and *Vachellia (Acacia) seyal*. Producers harvest the gum commercially from wild trees, mostly in Sudan (80%). Gum *arabic* has eminent qualities as an emulsifier, stabilizer, thickener or adhesive of

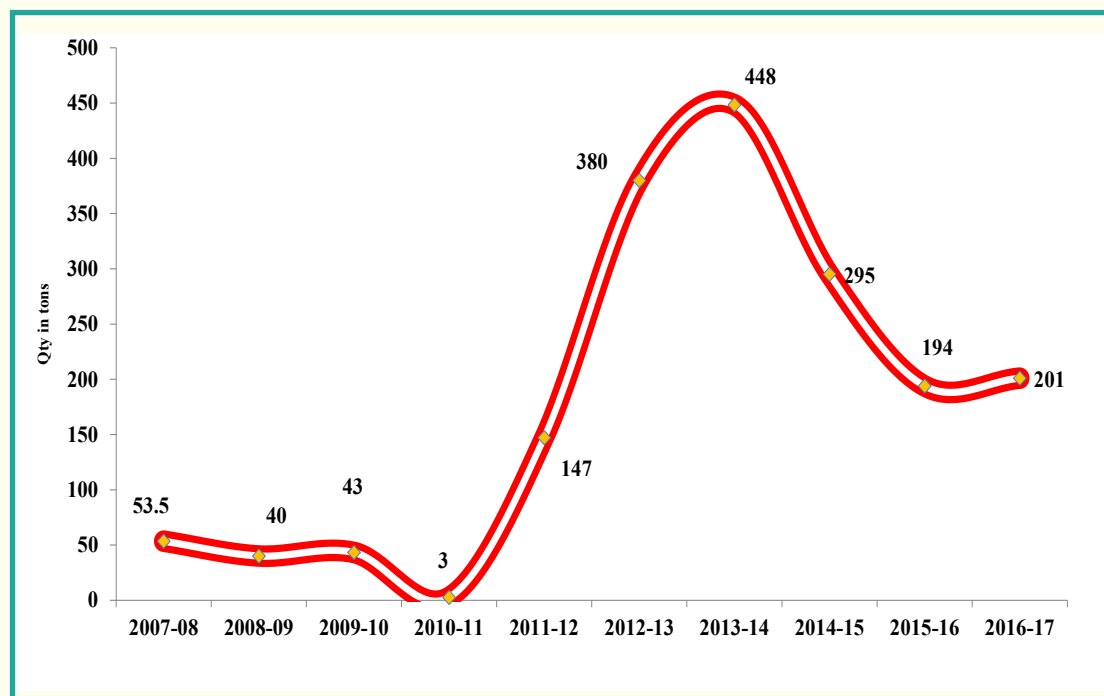


Figure 28. Year wise production scenario of gum ghatti in India

a non-toxic nature and its low calorific value and high soluble fibre, which are of major importance in nutrition and dietary applications. Pharmaceutical drugs and cosmetics also use the gum as a binder, emulsifying agent, and a suspending or viscosity increasing agent. Gum production is excellent on poor soils and higher in stressed trees. Gum exudes from the duct of the inner bark and is tapped in the hot season (May-June) when the trees are under stress and annual gum production in India is about 5-10 tons.

International trade of gum *Arabic*

The three main producing countries are Sudan, Mali, Nigeria, UAE and Senegal which cover about 90% of the global export market of the gum *arabic*. Destination wise export and source wise import share is depicted in Table 26. There is high demand of gum *arabic* from and in India also. About 5000 tons of gum *arabic* exported to Nepal (75.36 %), Iran (9.99%), Bangladesh Pr (5.57 %) and China P Rp (2.99 %)



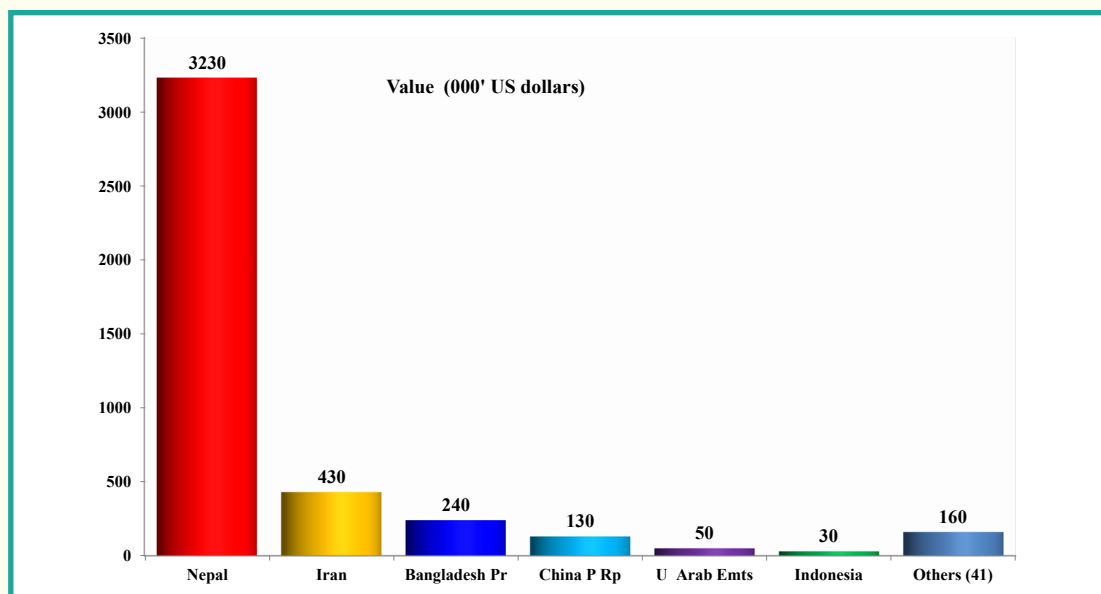


Figure 29. Destination wise scenario of gum Arabic during 2016-17

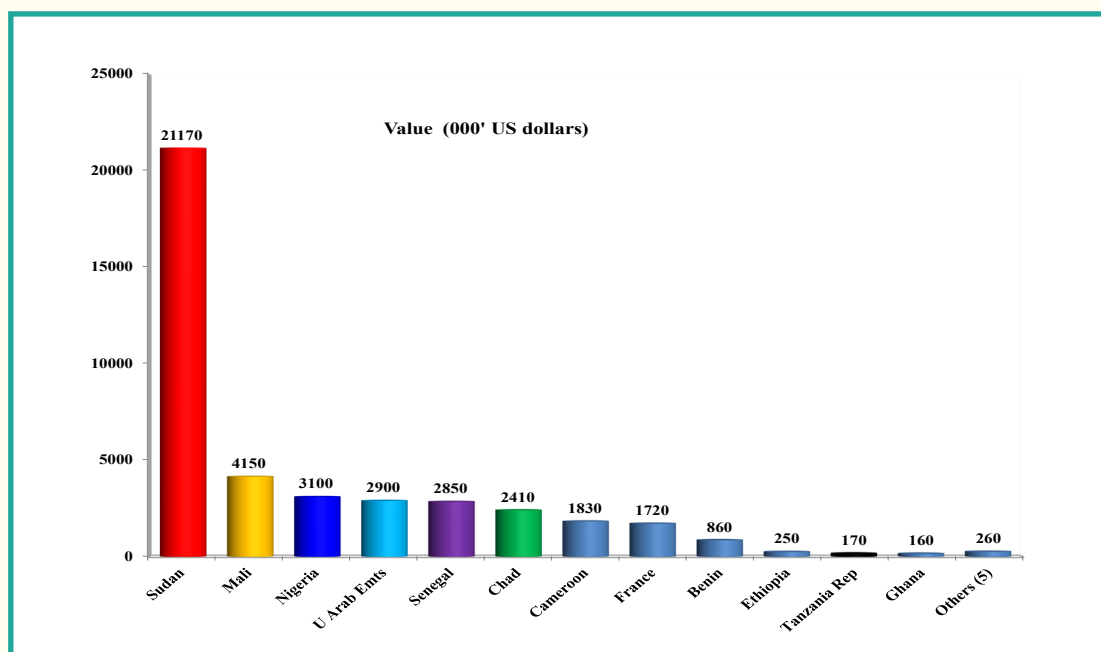


Figure 30. Source wise scenario of gum Arabic during 2016-17

remained as major export destinations during 2016-17. About 94 % gum *arabic* supplied to these top 3 destinations (Figure 29). It was noted that Nepal emerged as major importer for gum *Arabic* in 2015-16 and 2016-17. However, the exported quantity in Nepal (88.52%) was of poor quality (grade-III). In the international market, price of gum *arabic* ranged from ₹525-620/kg for Grade-I, ₹120-310/kg for Grade-II, ₹70-110/kg for Grade-III. During 2016-17, gum *arabic* was exported across the globe in 47 countries (Figure 30).


Table 26. Export and import of gum Arabic during 2016-17

Country	Quantity (tons)	Value (₹ lakh)	Value (000' US dollars)	Share (%)
Export				
Nepal	5207.67	2146.58	3230.00	75.36
Iran	17.00	284.47	430.00	9.99
Bangladesh Pr	87.91	158.57	240.00	5.57
China P Rp	42.00	85.30	130.00	2.99
U Arab Emts	20.09	34.94	50.00	1.23
Indonesia	6.00	23.32	30.00	0.82
Japan	4.20	14.75	20.00	0.52
Qatar	0.38	8.24	10.00	0.29
Oman	3.95	8.20	10.00	0.29
Sri Lanka Dsr	4.97	8.16	10.00	0.29
Singapore	3.00	7.98	10.00	0.28
Canada	5.51	6.68	10.00	0.23
Kenya	6.79	5.88	10.00	0.21
Saudi Arab	4.21	5.62	10.00	0.20
Nigeria	4.80	5.25	10.00	0.18
Bulgaria	1.61	5.07	10.00	0.18
Others (31)	30.19	39.455	50.00	1.37
Total	5450.28	2848.47	4270.00	100.00
Import				
Sudan	22563.38	14219.60	21170.00	50.67
Mali	4415.41	2773.54	4150.00	9.88
Nigeria	5326.42	2080.14	3100.00	7.41
U Arab Emts	3707.88	1946.52	2900.00	6.94
Senegal	2891.83	1900.45	2850.00	6.77
Chad	2680.68	1615.35	2410.00	5.76
Cameroon	2279.00	1225.72	1830.00	4.37
France	404.86	1158.62	1720.00	4.13
Benin	1208.00	575.87	860.00	2.05
Ethiopia	200.00	168.89	250.00	0.60
Tanzania Rep	172.60	117.73	170.00	0.42
Ghana	276.00	110.21	160.00	0.39
U S A	90.28	80.71	120.00	0.29
Italy	16.20	52.46	80.00	0.19
Others (3)	9.80	38.895	60.00	0.13
Total	46,242.34	28,064.71	41830.00	100.00



International trade of Asian gum

There is high demand of *Asian* gum from and in India also. Destination wise export and source wise import share of *Asian* gum is depicted in Table 27 and graphical presentation of direction of trade is illustrated in Figure 31.

During 2016-17, about 395 tons of *Asian* gum was exported from the country. Germany (39.76 %), Belgium (12.16 %), Japan (10.41 %), Malaysia (6.74 %), Finland (4.42 %), UK (4.35 %), Lithuania (4.31 %), Russia (2.65 %), USA (2.5 %), South Africa (1.92%), Turkey (1.85 %) and Hungary (1.44 %) remained as major export destinations. About 93 % *asian* gum supplied to these top 12 destinations and rest was supplied to 23 countries. During 2016-17, Indonesia (55.8 %) and Singapore (44.2 %) have supplied raw *Asian* gum for India.

Table 27. Export and import of Asian gum during 2016-17

Country	Quantity (tons)	Value (₹ lakh)	Value (000' US dollars)	Share (%)
Export				
Germany	155.53	536.82	800.00	39.76
Belgium	50.00	164.19	250.00	12.16
Japan	20.80	140.51	210.00	10.41
Malaysia	22.30	90.96	140.00	6.74
Finland	18.00	59.71	90.00	4.42
U K	31.89	58.75	90.00	4.35
Lithuania	18.00	58.26	90.00	4.31
Russia	6.00	35.79	50.00	2.65
U S A	13.73	33.78	50.00	2.50
South Africa	7.06	25.93	40.00	1.92
Turkey	6.25	24.93	40.00	1.85
Hungary	6.00	19.51	30.00	1.44
France	10.00	18.49	30.00	1.37
Australia	4.63	16.58	20.00	1.23
Korea Rp	2.00	14.92	20.00	1.10
Korea Dp Rp	2.00	14.81	20.00	1.10
Others (19)	20.88	36.34	50.00	2.69
Total	395.07	1350.28	2020.00	100.00
Import				
Indonesia	17.75	7.18	10.00	55.79
Singapore	7.91	5.69	10.00	44.21
Total	25.66	12.87	20.00	100.00

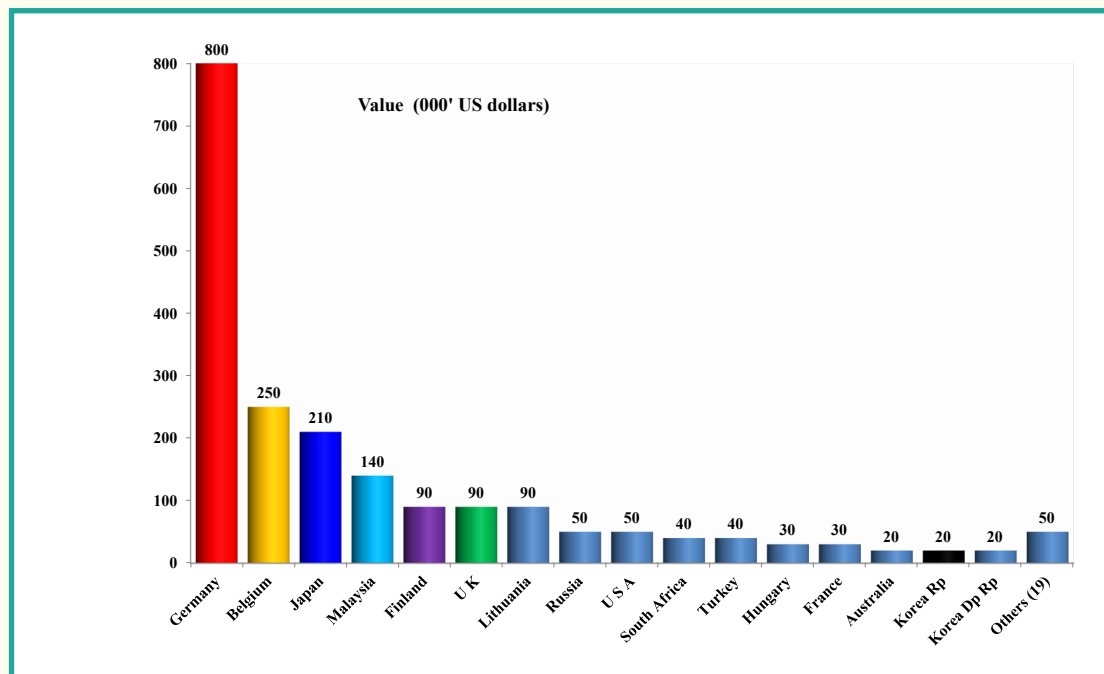


Figure 31. Destination wise scenario of Asian gum during 2016-17

International trade of African gum

In India, *African* gum is supplied from African countries for domestic consumption and rest is re-exported. It is evident from the Table 28 that France was only the major export destination of *African* gum.

Tragacanth (Adracanth) (*Astragalus gummifer*)

Tragacanth gum (TG) is a natural and acidic polysaccharide that secretes spontaneously or with a scratch on the different species of *Astragalus* plant. It is also used as an adhesive in the rolling of cigars. EXIM scenario of Tragacanth (Adracanth) during 2016-17 is given in Table 29.

Table 28. Export of *African* gum during 2016-17

Country	Quantity (tons)	Value (₹ lakh)	Value (000' US dollars)	Share (%)
France	4.94	0.35	10.00	100.00

Table 29. Export of Tragacanth (Adracanth) during 2016-17

Country	Quantity (tons)	Value (₹ lakh)	Value (000' US dollars)	Share (%)
UK	1.20	9.82	14.66	100.00

Xanthan gum

Xanthan gum is a polysaccharide used as a food additive and rheology modifier, commonly used as a food thickening agent and in oil field drilling. The bacterium forms a slimy substance that acts as a natural stabilizer or thickener. In foods, *xanthan* gum is most often found in salad dressings and sauces.



It helps to prevent oil separation by stabilizing the emulsion, although it is not an emulsifier. Toothpaste often contains xanthan gum, wherein it serves as a binder to keep the product uniform. EXIM scenario of *xanthan* gum during 2016-17 is given in Table 30.

Table 30. Export and import of *xanthun* gum during 2016-17

Country	Quantity(tons)	Value (₹ lakh)	Value (000' US dollars)	Share (%)
Export				
Ghana	0.10	0.22	0.33	2.40
Nigeria	0.40	2.14	3.19	23.36
U Arab Emts	1.00	5.67	8.46	61.90
Baharain Is	0.10	0.50	0.75	5.46
China P Rp	1.00	0.63	0.94	6.88
Total	2.60	9.16	13.67	100.00
Import				
China P Rp	56.50	76.75	114.55	95.45
Poland	0.38	3.65	5.45	4.55
Total	56.88	80.40	120.00	100.00

Plant Exudate: Other gums

The other important gums are gum *arabic* (*A. senegal*), Gum kondagogu (*Cochlospermum gossypium*), *saja* (*T. tomentosa*), *Jhingan* (*L. coromandelica*), *babool* (*A. nilotica*), *palas* (*B. monosperma*), *khair* (*A. catechu*) and *char* (*B. lanzan* Spreng). Gujarat is major *guggal* gum and *prosopis* gum/*babool* gum producing state. Gum kondagogu is a naturally occurring nontoxic polysaccharide derived as an exudate from the bark of *C. gossypium* (*Bixaceae* family), a native tree of India. The total production of other gums across various states was around 290.0 tons during 2016-2017 (Table 31). It has been demonstrated graphically in Figure 32.

Table 31. Production of other gums in India (in tons)

State /Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	Average
Andhra Pradesh	6.59	9.23	12.94	13.79	9.12	8.93	5.18	9.40
Telangana	1.16	2.24	0.60	0.65	3.50	3.55	5.00	2.38
Chhattisgarh	1.07	3.44	1.90	0.50	0.00	92.00	10.00	15.56
Gujarat	27.49	31.04	41.12	53.22	50.00	15.00	15.00	33.27
Jharkhand	240.60	200.50	125.60	60.20	40.00	50.00	60.00	110.99
Madhya Pradesh	280.00	250.00	200.00	174.60	100.00	100.00	100.00	172.09
Maharashtra	200.00	140.00	100.00	192.00	88.00	80.00	50.00	121.43
Others	100.00	80.00	70.00	72.30	42.00	40.00	40.00	63.47
Total	856.91	716.45	552.16	567.26	332.62	389.48	285.18	528.58

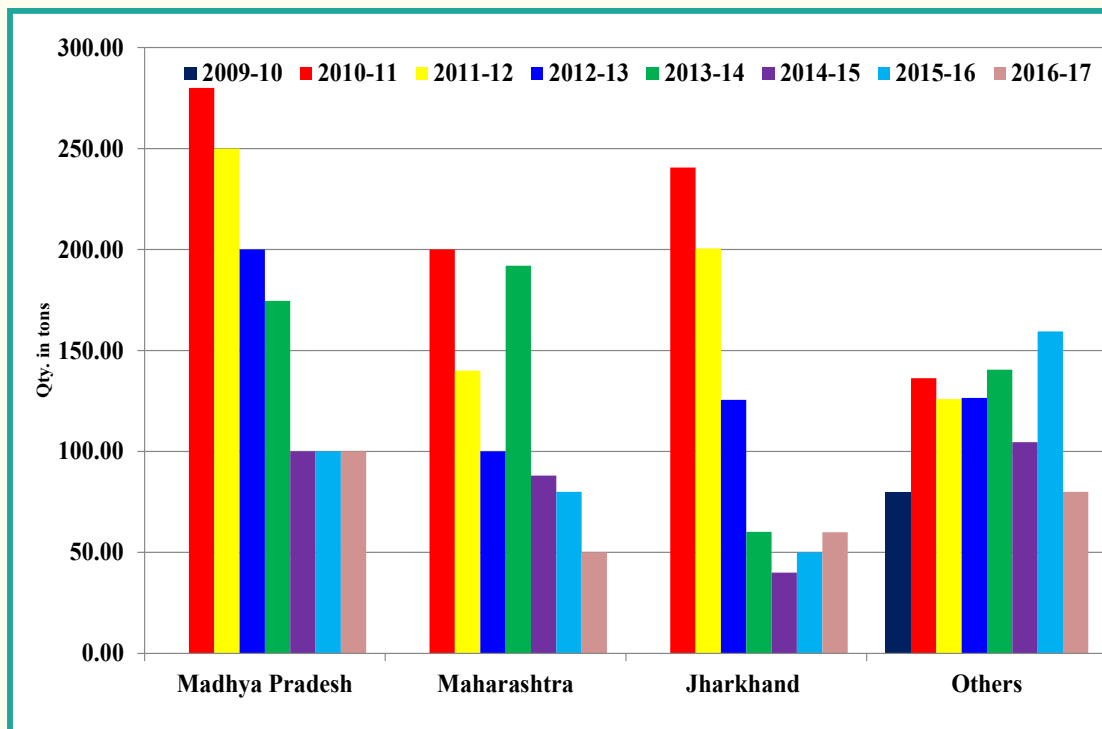


Figure 32. Total production of other gums across various states in India

Jhingan gum (Lannea coromandelica)

L. coromandelica (*Jhingan*, Indian Ash Tree, *Moi* tree) is a deciduous tree which is the source of *Jhingan* gum. It is mostly obtained from natural exudation and sometimes by tapping and annual gum production is about 60-80 tons in India. It is used as an alternative to gum *arabic* in food and other purposes.

Saja (Terminalia tomentosa)

T. tomentosa (*Saja*, *Saj*) is a tree growing upto 30 m tall, with a trunk upto diameter of 1 m. A copious transparent gum exudes in large globular tears from the trunk. In India, the annual *saja* gum production is about 30-40 tons. It is used as an incense and cosmetic. *T. tomentosa* has a remarkable attribute as some members of the species store water in the dry season.

Collection price and grading

The collection rate of *jhingan*, *khair* and *babool* gum ranged from ₹ 2000 to 5000/qt. Retail packing price of the *babool* gum in Gujarat increased from ₹170/kg to ₹220/kg.

Acacia gum has been harvested in Arabia, Sudan, and West Asia since antiquity, sub-Saharan acacia gum has a long history as a prized export and get lesser value due to lac of primary processing. Currently, gum-producing *Acacia* species are harvested in Mauritania, Senegal, Mali, BurkinaFaso, Niger, Nigeria, Chad, Cameroon, Sudan, Somalia, Ethiopia, Kenya and Tanzania. Grade-wise collection price of other gums in India is depicted in Table 32.



**Table 32. Collection price of other gums in India (grade wise)**

Natural gum	Scientific name	Grade	Price (₹/Kg)
Guggul gum	<i>C. wightii</i>	I	600-650
Guggul gum	<i>C. wightii</i>	II	250-260
Guggul gum	<i>C. wightii</i>	III	150-175
Salai gum	<i>B. serrata</i>	I	125-150
Khair gum	<i>A. catechu</i>	I	50-75
Babool gum	<i>A. nilotica</i>	I	50
Babool gum	<i>A. nilotica</i>	II	35
Babool gum	<i>A. nilotica</i>	III	30
Others			40-50

Regulations and governance

On the basis of regulations and governance issues for trading of NWFPs including natural resins and gums, the Government has classified as nationalized items, monopoly items and non-nationalized items. State Government classifies NWFPs as nationalized items, which can only be traded / marketed by Forest Department and it may vary from state to state. Four major gums namely *karaya/kullu* gum (*S. urens*), gum ghatti/ *dhawada* gum (*A. latifolia*), *babool* gum (*A. nilotica*) and *khair* gum (*A. catechu*) are categorized under nationalized gums in some states. 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 NWFPs to some agency under lease agreement, based on sustainable harvesting and economic value. Apart from nationalized and monopoly items, remaining NWFPs 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 is presented in Annexure IV.

Seed based natural gum-Guar gum

India is a native of *guar* or cluster bean (*Cyamopsis tetragonoloba*) grown in dry regions. It is used as a vegetable by households, as cattle food (whole green plant), as cattle feed (*churi* and *korma*) and as a green manure crop in agriculture. The growing season of *guar* is 14 to 16 weeks and requires reasonably warm weather and moderate flashing rainfall with plenty of sunshine. 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 produce in the market is seen in October to December while lean arrival in the months of January to May. In major guar producing areas like Rajasthan, Haryana and Gujarat, *guar* crop is grown after the first shower of monsoon in July to early August and is harvested in late October to early November. It is grown as the rainfed crop and its production totally depends on the performance of monsoon. The decline in production due to deficient rainfall during 2009-10 also confirmed this fact.

Guar gum comes from the endosperm (30%) of the seed. There are various grades of *guar* gums pure and its derivatives. *Guar* gum is a white to creamy coloured, free flowing powder without any extraneous matter. Its ability to bind water, control the viscosity of aqueous solutions, form strong and tough films have accounted for its wider application and consequently the rapid growth.

Guar seed production in India

India contributes about 80% to the world *guar* production and Pakistan is the second largest producer. All India area, production and yield of *guar* seed has been presented in Table 33. State wise area, production and yield of *guar* seed has been presented in Table 34.



Table 33. All India area, production and yield of guar seed and potential of guar gum production
(Area- thousand ha, Production- thousand tons, Yield- kg/ha,)

Year	Area	Production	Yield	Potential of guar gum production
2010-11	3387.9	1966.5	580	655.5
2011-12	3465.0	2233.1	644	744.4
2012-13	5156.9	2457.2	476	819.1
2013-14	5863.7	3390.7	578	1130.2
2014-15	5360.9	3285.0	613	1095.0
2015-16	5574.0	2815.2	505	938.4
2016-17	4060.0	1805.2	445	601.7

Source: Directorate of Economics and Statistics, MoA, GoI; www.rsamb.rajasthan.gov.in

Table 34. State wise area, production and yield of guar seed during previous seven years

State	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	Average
State wise area of guar seed during previous seven years (thousand ha)								
Andhra Pradesh				3.04	1.07	1.00	1.00	1.53
Gujarat	124.60	128.30	207.10	278.00	278.00	297.00	192.00	215.00
Haryana	256.00	215.00	388.00	481.00	406.00	457.00	315.00	359.71
Punjab	24.00	25.00	26.00	28.20	48.60	30.00	20.00	28.83
Rajasthan	2980.95	3094.16	4533.27	5070.92	4625.21	4787.01	3530.01	4088.79
Uttar Pradesh	2.40	2.50	2.50	2.50	2.00	2.00	2.00	2.27
All India	3387.95	3464.96	5156.87	5863.66	5360.87	5574.01	4060.01	4695.48
State wise production of guar seed during previous seven years (thousand MT)								
Andhra Pradesh				3.00	1.00	0.90	0.80	1.43
Gujarat	73.00	74.50	128.50	133.60	167.00	179.00	132.00	126.80
Haryana	333.00	290.00	278.00	369.00	338.00	380.00	248.00	319.43
Punjab	18.00	20.00	22.00	21.20	33.40	30.00	18.00	23.23
Rajasthan	1540.54	1846.61	2026.67	2861.94	2743.97	2223.71	1404.82	2092.61
Uttar Pradesh	2.00	2.00	2.00	2.00	1.60	1.60	1.60	1.83
All India	1966.54	2233.11	2457.17	3390.74	3284.97	2815.21	1805.22	2564.71
State wise yield of guar seed during previous seven years (Kg/ hectare)								
Andhra Pradesh				987	937	900	800	906
Gujarat	586	581	620	481	601	603	688	594
Haryana	1301	1349	716	767	833	832	787	941
Punjab	750	800	846	752	687	1000	900	819
Rajasthan	517	597	447	564	593	465	398	512
Uttar Pradesh	833	800	800	800	800	800	800	805
All India	580	644	476	578	613	505	445	549

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, Churu, Bikaner, Jaisalmer, Barmer, Nagaur, Hanuman Garh, Jodhpur, Ganganagar, Jaipur, Sirohi, Dausa, Jhunjhunu and Sikar are the districts where guar crop



cultivated. Gurgaon, Mahendragrh and Rewari districts of Haryana and few districts like Kutch, Banaskantha, Mehsana, Sabarkantha, Vadodara and Ahmadabad of Gujarat are also *guar* producing areas in the country. 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. Sri Ganganagar, Hissar, Alwar, Sirsa, Jodhpur, Bikaner, Jaipur are the major markets for *guar* seed. Mainly *guar* gum is used in paper, textile, oil drilling, mining, explosives, ore flotation and other various industrial applications. Out of the decadal average potential production of *guar* gum around 6.5 lakh tons in the country, around 3.0 lakh tons is consumed in the domestic market as raw as well as processed and around 3.5 lakh tons is exported.

Processing of *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 35).

Table 35. Various varieties of processed products of *guar* gum for industrial applications

Varieties	Applications	Varieties	Applications
Hydroxy alkylated <i>guar</i> gum	Oil well drilling	Sulphated <i>guar</i> gum	Mining
Carboxy methylated <i>guar</i> gum	Textile printing, Tobacco industry, water based paints	<i>Guar</i> gum formate	Food-Human and animal, Miscellaneous
Oxidised <i>guar</i> gum	Paper industry Food, textile printing applications	<i>Guar</i> gum acryl amide	Pharmaceutical industry
Acetates of <i>guar</i> gum	Food-Human and animal	Borate cross linked <i>guar</i> gum	Photography, Oil well drilling, carpet printing
Cationic derivatives of <i>guar</i> gum	cosmetic and paper industries	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. *Guar* seed prices in near future in domestic market may remain stable or increase slightly as the below normal production during 2016-17. The international price scenario of different grades of *guar* gum during 2005-06 to 2016-17 is shown in Figure 33.

International trade of *guar* gum

The share of agricultural exports in India's total exports decreased from 12.64% in 2013-14 to 12.26% in 2016-17. Agricultural exports decreased from ₹2396.81 billion in 2014-15 to ₹2266.52 billion in financial year 2016-17 registers a decline of nearly 5.4%. Decrease in the value of agricultural exports during 2016-17 was primarily on account of lower exports of wheat, other cereals, oil meals, *guar* gum,

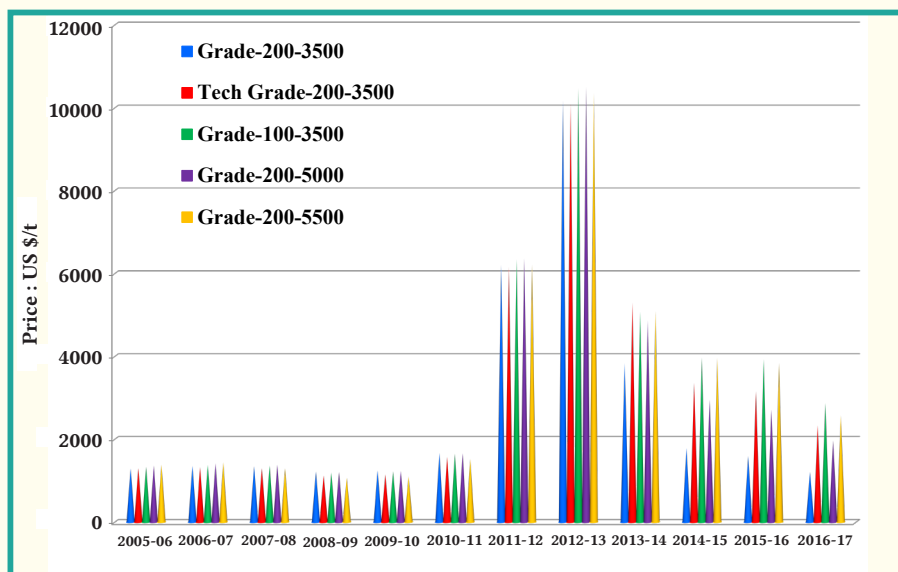


Figure 33. International price level of different grades of *guar*

basmati rice and buffalo meat. India's top exports of processed agricultural commodities in terms of quantity and value for three years have been given in the Table 36. Decrease in value of agricultural exports during 2015-16 was primarily on account of lower exports of wheat (58%), *guar* gum (9%), *basmati* rice (5%) and Buffalo meat (1%). *Guar* gum has been the topmost export commodity in agri-export during previous years like in 2012-13. But, in 2014-15 it ranked on 4th position after buffalo meat, *basmati* and non-*basmati* rice and subsequently in 2015-16 it ranked on 6th position after buffalo meat, *basmati*, non-*basmati* rice, groundnuts and cereal preparations and similarly in 2016-17.

Table 36. Top agri-export commodities during previous three years

Particulars	Export Value (₹ in crores)			% share of top six in total agri- export		
	2014-15	2015-16	2016-17	2014-15	2015-16	2016-17
i. <i>Guar</i> gum	9153	3012	2736	3.8	1.4	1.2
ii. <i>Basmati</i> rice	27599	22714	21513	11.5	10.5	9.5
iii. Buffalo meat	29283	26682	26303	12.2	12.4	11.6
iv. Non- <i>basmati</i> rice	20336	15086	17121	8.5	7.0	7.6
v. Other cereals	5258	5405	1424	2.2	2.5	0.6
vi. Wheat	4975	1062	444	2.1	0.5	0.2
Total (S. No. i-vi)	96604	73961	69542	40.3	34.3	30.7
Total agri-export	239681	215397	226652	100.0	100.0	100.0

Source: MoC&I, GOI, DGCIS & APEDA Annual Report.

Export of *guar* gum during X and XI plan period, export and production capacity during 2007-08 to 2016-17 is given in Table 37 and Figure 34. 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 318.25 thousand tons of *guar* gum to the world for the worth of ₹ 2736 crores during the year 2016-17. India is also the leading net exporter of *guar* seeds. The country exports over 3.18 lakh tons of *guar* and its derivatives excluding *guar* meal and it is comprised by 2.76 lakh tons of treated and pulverized *guar* gum (79%) and 41,178 tons of refined split *guar* gum (8%). Other *guar* based products were *guar* meal and traces of *guar* seed. Composition of *guar* gum export from India is given in Figure 35. Destination

wise overseas demand and source wise supply of *guar* meal, *guar* gum refined split (GGRS), *guar* gum treated and pulverized (GGTP) and in India from the overseas countries is illustrated through pie charts in Figure 36, Figure 37, Figure 38 and Figure 39, respectively.

Table 37. Export of *guar* gum during XI and XII plan period

Year	Quantity (in '000 tons)	Value (in ₹ crore)	Value (in US million dollar)
11th Plan Period			
2007-08	124	611	276.63
2008-09	258	1334	284.95
2009-10	218	1130	227.26
2010-11	364	2749	631.65
2011-12	627	16407	3330.74
Average (Eleventh Plan)	318	4446	950.25
12th Plan Period			
2012-13	331	21147	3893.53
2013-14	469	11445	1931.60
2014-15	521	9153	1498.54
2015-16	256	3012	462.61
2016-17	318	2736	408.16
Average (Twelfth Plan)	379	9499	1638.89
Pooled average	349	6972	1294.57

Source: MoC&I, GoI; APEDA Annual Report.

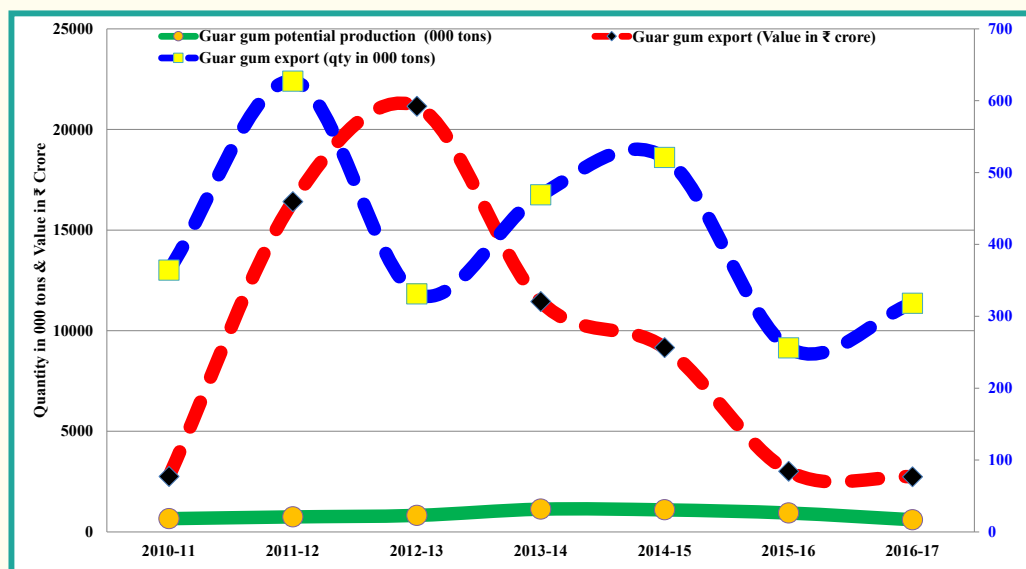


Figure 34. Trends in production potential and export of guar gum from India

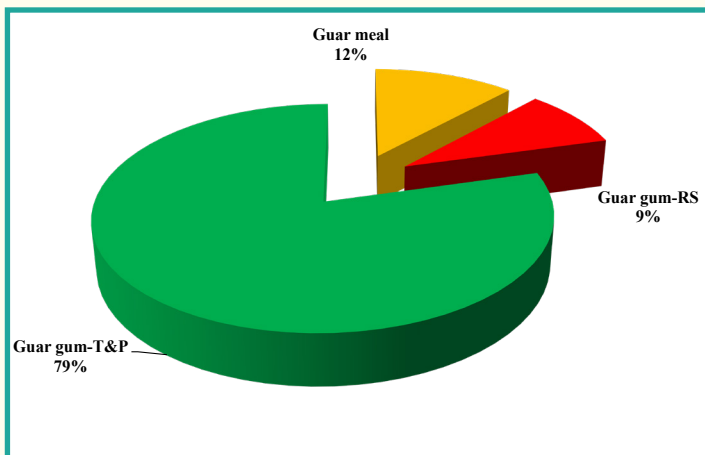


Figure 35. Composition of guar gum export from India during 2016-17

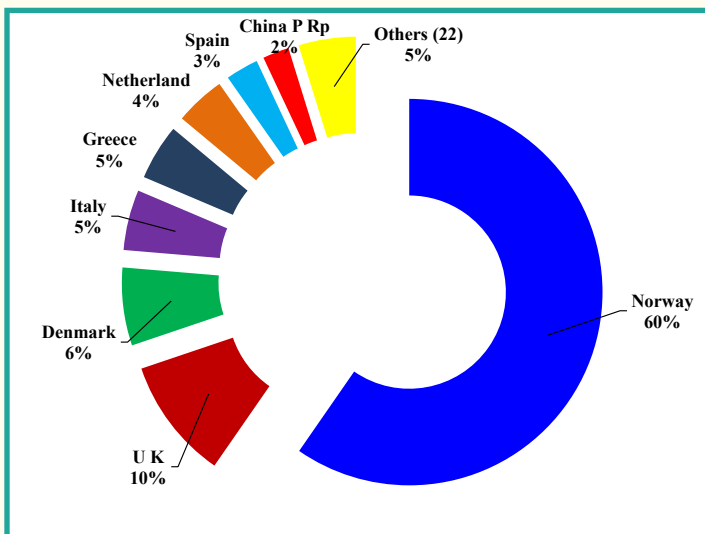


Figure 36. Destination wise scenario of guar meal during 2016-17

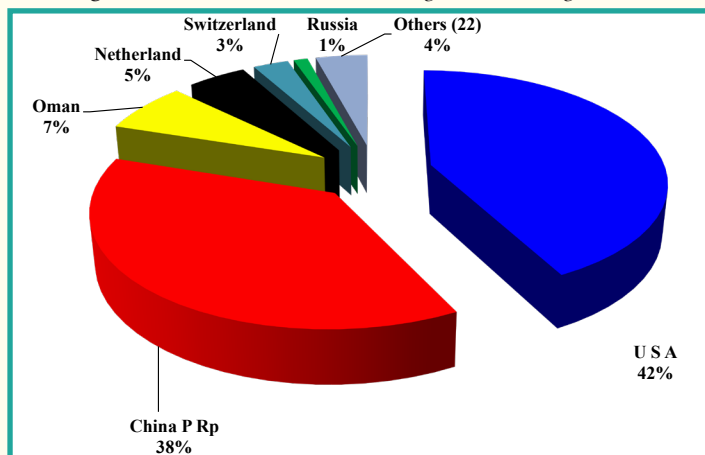


Figure 37. Destination wise scenario of guar gum refined split during 2016-17

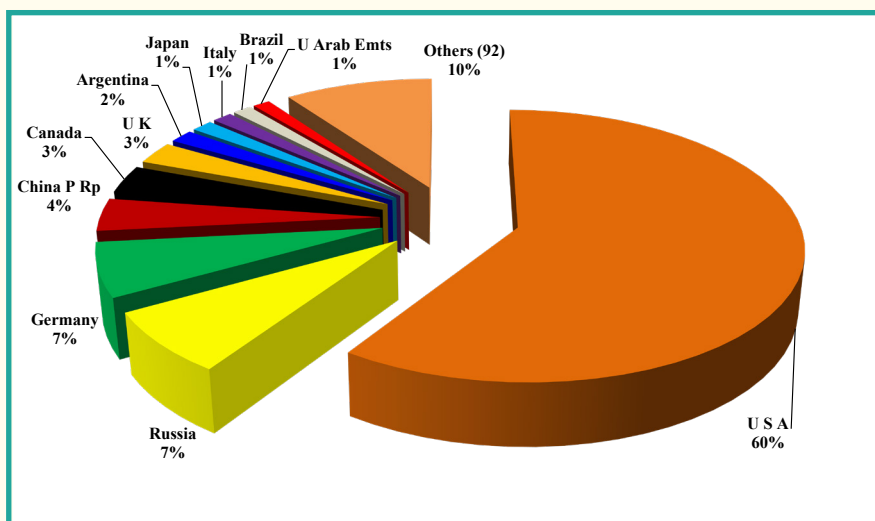


Figure 38. Destination wise scenario of guar gum treated and pulverized during 2016-17

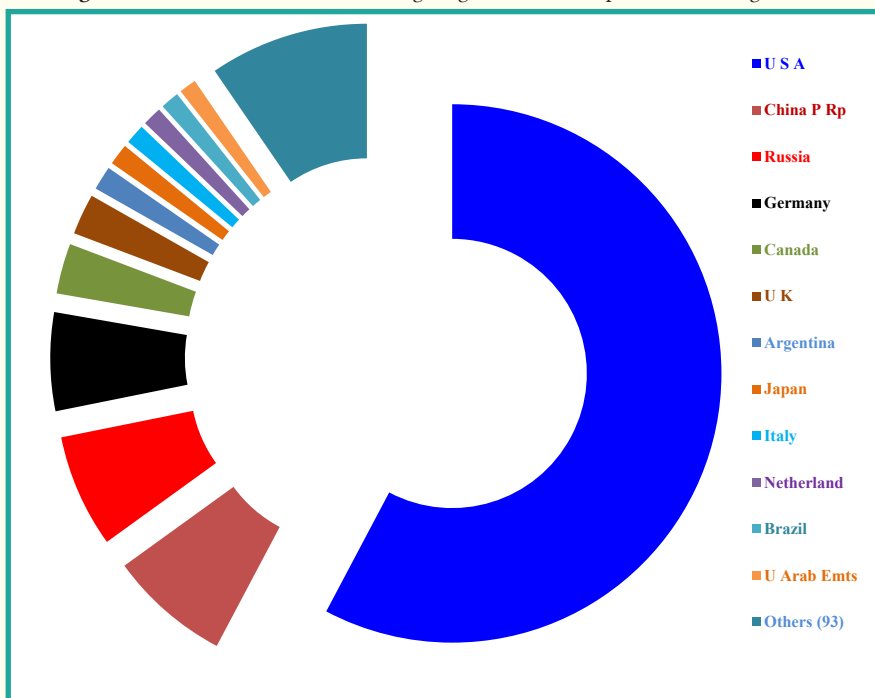


Figure 39. Destination-wise quantitative share of the guar gum exported from India (Overall)

United States, China, Russia, Germany, Canada, UK, Argentina, Japan, Italy, Netherlands, Brazil, and UAE remained as major export destinations in 2016-17. During 2016-17, guar gum was exported across the globe to 105 countries. About 90 % was exported to top 12 countries and rest 10 % was exported to 93 countries around the world. Other countries are Spain, Australia, Indonesia, Denmark, Belgium, Turkey, Greece, Thailand, France, Mexico, South Africa, Korea Republic, Poland, Chile, Iran, Malaysia, Philippines, Oman, Egypt Arab Republic, Ukraine, Taiwan, Israel, Colombia, Saudi Arabia, Iraq, Sri Lanka, etc. Destination wise export share is depicted in Figure 20.



Cassia gum

Cassia tora seeds, traded under ITC (HS) Code 09109915, have remained another commodity in high exports over the ten year period from 2005-06 to 2014-15 with its export volume increasing over ten times from 2083 tons during 2005-06 to 28190 tons during 2014-15, with a corresponding increase in export value from ₹ 3.57 crore in 2005-06 to ₹123.99 crore in 2014-15 (Table 38). However, its export has declined to 15160 tons with an export value of ₹71 crore in 2016-17. The export price per kg has also increased from just about ₹ 17 per kg in 2005-06 to ₹ 46 per kg in 2016-17.

Table 38. Export and import of Cassia tora seeds during 2016-17

Country	Quantity (tons)	Value (₹ lakh)	Value (US million dollars)	Share (%)
Export				
Vietnam Soc Rep	7,643.00	1,589.45	2.38	22.44
Taiwan	3,556.00	1,352.42	2.02	19.09
Japan	2,426.08	1,208.05	1.80	17.05
Netherland	439.00	1,270.95	1.90	17.94
Korea Rp	323.75	142.55	0.21	2.01
Germany	209.00	237.41	0.35	3.35
Australia	169.00	394.20	0.59	5.56
Russia	140.00	411.89	0.61	5.81
U K	131.00	204.16	0.30	2.88
Others (9)	123.05	273.27	0.41	3.86
Total	15,159.88	7,084.35	10.57	100.00
Import				
Nigeria	474.86	142.72	0.21	75.21
Japan	50	26.27	0.04	13.84
Vietnam Soc Rep	8.04	20.77	0.03	10.95
Total	532.9	189.76	0.28	100.00

Psyllium gum

Psyllium is the common name used for several members of the Isabgul plant genus *Plantago* whose seeds are used commercially for the production of mucilage. The genus *Plantago* contains over 200 species. *P. ovata* and *P. psyllium* are produced commercially in several European countries, the former Soviet Union, Pakistan, and India. *Plantago* seed known commercially as black, French or Spanish *psyllium* is obtained from *P. psyllium* and *P. arenaria*. Seed produced from *P. ovata* is known in trading circles as white or blonde *psyllium*, Indian *Plantago* or Isabgul. Isabgul, the common name in India for *P. ovata*, comes from the Persian words "isap" and "ghol" that mean horse ear, which is descriptive of the shape of the seed. India dominates the world market in the production and export of *psyllium*.





Production Scenario of Isabgul and *Psyllium* gum

Isabgul is an irrigated Rabi crop which remains in the field for about 4 months. It was a native of Persia, now grown in the western part of India. The main producing states are Gujarat, Rajasthan, MP & Harayana as a cash crop in the Mehsana, Patan and Banaskantha districts of north Gujarat. Presently, India is the largest producer as well as exporter of Isabgul and *Psyllium* husk in the world. The main producing states are Gujarat, Rajasthan, MP, and Haryana. Gujarat and Rajasthan are reported to have an area of around 60,000 hectares under its cultivation. The climatic conditions of the Gujarat & Rajasthan are most suitable for the Isabgul cultivation; and both the states contribute almost equally in terms of production, but regarding further processing and manufacturing of husk, Gujarat is the leading state. In Rajasthan Isabgul producing areas are mainly Jalore, Sirohi, Badmer, Pali, Chittore, i.e. mainly southern Rajasthan. Every year one lakh tons of Isabgul is required to be produced in order to meet the demand. But its production is highly variable year after year because of its environmental sensitive nature. Due to the above two factors (production figure and its demand driven nature) the price also varies accordingly. Husk production can be estimated about 18,000-19,000 tons, out of which 14,000-15,000 tons is exported every year.

Price and Market Scenario of Isabgul

The main product Isabgul Husk obtained about 25% - 26% from the Isabgul seed. The major portion of husk (about 80-90%) is exported. Therefore various determining factors like - international export competitiveness, currency exposures, political influence, EXIM policy etc. affect the industry. The prices are influenced by the demand and supply condition. However, the previous years' stock plays an important role in the determination of prices. The unbranded psyllium husk is highly sensitive to the demand-supply gap. However branded & value added processed husk are less price sensitive in international market due to the cartel of importers' pressure. The price of Isabgul is determined by visual inspection method. For the last 4 years approximately the price trend of average quality Isabgul seed was ₹20 - ₹23/Kg. Three varieties usually arrive in the market- packed quality (premium quality), foreign quality and lower foreign quality.

Processing activities for *psyllium* gum

The processing activities are mainly undertaken in Gujarat. During the processing the millers remove psyllium husk from the Isabgul seeds. This process is called de-husking. The main byproducts are Lali (cattle feed), Chito (Pig feed) and Khakho (used to prevent ice slipping) and Golaisab (cattle feed).

Domestic and overseas demand

The local demand for the psyllium is also increasing day by day. About 20 to 25 % of total production of Husk is consumed in the domestic market. Indian pharmacy companies are using psyllium husk for making various drugs. There are various local brands having good market size across the country. There are reported to be around 70 organizations all over the country undertaking export of Isabgul husk and seed. Handfuls of these organizations are found to have lion's share of the total export from India. India exports Isabgul seeds and husk worth more than Rs 25 million annually. From the total production of husk in Gujarat, 75% is exported. The largest buyer of Isabgul from India is the Germany, Pakistan and Iran, accounting for around 65% of the total *psyllium* seed exports from India. *Psyllium* husk is bought by the pharma and drugs companies. The main buyers are Procter & Gamble (USA), Dr Morepen (USA), Al Parigo (USA), etc. The other main importers of psyllium husk and seeds are Sweden, Australia, UAE, USA, Saudi Arab, Denmark, Canada, Spain, Austria, Belgium, UK, Israel and Thailand (Table 39).


Table 39. Export of *psyllium* seed (Isobgul) during 2016-17

Country	Quantity (tons)	Value (₹ lakh)	Value (US million dollars)	Share (%)
Germany	378.77	495.25	0.74	28.72
Pakistan Ir	72.30	327.31	0.49	18.98
Iran	225.00	304.27	0.45	17.64
Sweden	110.60	157.73	0.23	9.15
Australia	48.49	149.80	0.22	8.69
U Arab Emts	70.00	92.12	0.14	5.34
U S A	22.66	48.41	0.07	2.81
Saudi Arab	15.44	31.30	0.05	1.81
Denmark	10.00	28.59	0.04	1.66
Canada	3.73	16.26	0.02	0.94
Spain	10.00	13.63	0.02	0.79
Austria	8.00	12.79	0.02	0.74
Belgium	2.25	10.38	0.02	0.60
U K	2.95	5.30	0.01	0.31
Israel	0.80	3.60	0.01	0.21
Thailand	3.30	3.48	0.01	0.20
Others (26)	20.88	24.38	0.00	1.41
Total	1005.17	1724.60	2.54	100.00

Tamarind gum

Tamarind gum is obtained from endosperm of the seeds of the tamarind tree (*Tamarindus indica* linn). Tamarind gum powder has application in paper, textile industry, livestock feed, pet food, Mining & Pharmaceutical Industries *etc.* Export scenario in 2016-17 is depicted in Table 40.

Table 40. Export of flour meal and powder of tamarind during 2016-17

Country	Quantity (tons)	Value (₹ lakh)	Value (US million dollars)	Share (%)
China P Rp	484.00	316.64	0.48	28.09
Indonesia	302.00	191.68	0.29	17.53
Germany	139.85	118.97	0.18	8.12
U S A	49.42	75.42	0.11	2.87
Australia	24.73	66.71	0.10	1.44
U K	51.50	53.80	0.08	2.99
Korea Rp	72.00	46.64	0.07	4.18
Turkey	67.00	43.22	0.07	3.89
Vietnam Soc Rep	63.80	40.08	0.06	3.70
South Africa	61.00	28.32	0.04	3.54
SRI Lanka Dsr	60.16	28.20	0.04	3.49
Taiwan	40.00	27.81	0.04	2.32
Qatar	21.19	16.70	0.02	1.23
Malawi	34.20	16.10	0.02	1.98
U Arab Emts	22.76	15.39	0.02	1.32
Mexico	22.99	15.26	0.02	1.33
Nepal	16.00	14.72	0.02	0.93
Thailand	22.00	13.88	0.02	1.28
Mozambique	21.22	13.40	0.02	1.23
Kuwait	9.81	12.42	0.02	0.57
Others (28)	137.51	80.41	0.13	7.98
Total	1723.14	1235.77	1.85	100.00



C. NATURAL GUMS RESINS

Under this category, *asafoetida*, *salai* gum and *myrrh* are the major gum resins. About 1400 tons of the gum resins exported from the country and ₹786 million earned as a foreign exchange.

Asafoetida (Hing)

Asafoetida (*Ferula anthrax* and *F. foetida*) is a popular spice used in daily food by Indians. Powder of Asafoetida is used as carminative and also used in fainting, flatulent colic and chronic bronchitis as well as it is used to treat asthma in adults (Kokate *et al* 2002).

International trade of Asafetida

In India, Asafetida was supplied from Afghanistan (92%) and Uzbekistan (5%) during 2016-17. On other hand, UAE (26.27%), USA (19.35%), Singapore (5.72%) and Myanmar (4.68%) are the major export destination of Asafetida (Table 45).

Table 41. Export and import of asafetida during 2016-17

Country	Quantity (tons)	Value (₹ lakh)	Value (US million dollars)	Share (%)
Export				
U Arab Emts	323.51	1507.40	2.25	26.27
U S A	179.43	1110.36	1.66	19.35
Singapore	66.74	328.30	0.49	5.72
Myanmar	70.20	268.41	0.40	4.68
U K	58.79	261.69	0.39	4.56
Kuwait	43.76	248.51	0.37	4.33
Oman	37.28	206.69	0.31	3.60
Malaysia	53.04	203.45	0.30	3.55
Saudi Arab	59.76	191.50	0.29	3.34
Thailand	43.53	186.43	0.28	3.25
Canada	39.05	173.72	0.26	3.03
Australia	27.25	145.70	0.22	2.54
Qatar	18.64	109.38	0.16	1.91
Kenya	20.98	86.76	0.13	1.51
Baharain IS	11.34	76.51	0.11	1.33
Nigeria	16.47	63.70	0.10	1.11
South Africa	16.42	59.63	0.09	1.04
Others (71)	104.18	510.26	0.74	8.88
Total	1190.37	5738.40	8.55	100.00
Import				
Afghanistan TIS	996.18	53683.37	80.05	92.00
Uzbekistan	121.05	3036.41	4.53	5.20
Iran	197.76	1515.16	2.26	2.60
Tajikistan	1.73	46.66	0.07	0.08
U Arab Emts	3.97	38.15	0.06	0.07
Kyrgyzstan	0.55	14.96	0.02	0.03
China P Rp	1.25	6.81	0.01	0.01
Kazakhstan	0.20	5.48	0.01	0.01
Total	1322.70	58347.01	87.00	100.00



Salai gum

Burseraceae family thrives in arid regions in the horn of Africa and southern Arabia. *Salai* gum (*Boswellia serrata*) *Frankincense*, also known as *Olibanum*, is an aromatic oleogum resin obtained from the bark of trees belonging to the genera *Boswellia* and usually collected by small nomadic groups; the name is derived from the Arab word “al Luban”, which means milk and is references to the milky sap that, exudes from the tree upon incision. Today frankincense is widely employed in aromatherapy, Catholic Christian ceremonies as well as other religious and secular traditions (Camarda *et al.*, 2016). It is also an important component in cosmetic industry and it is widely marketed as a food supplement (Khan, *et al.*, 2009).

Production and marketing scenario

In India, it occurs in dry hilly forests of Rajasthan, Madhya Pradesh, Gujarat, Bihar, Assam, Odisha as well as central peninsular regions of Andhra Pradesh, Assam etc. This gum is tapped from the incision made on the trunk of the tree which is then stored in specially made bamboo basket and converted into different grades of material according to flavor, color, shape and size. Harvesting frankincense is a time consuming process that begins in December, reaching a peak from March to May (Marshall 2003). The trees start producing resin when they are about 8 to 10 years old (Michie *et al.*, 1991). In India, *S. robusta*, *A. latifolia*, *T. tomentosa*, *B. serrata*, *B. lanzan*, *A. catechu*, *etc.* are reported as the important tree species by Champion and Seth (1968) and these species exhibit local dominance. Retail packing price *salai dhoop* in Gujarat increased from ₹ 250/kg to ₹400/kg.

International trade of olibanum

In India, olibanum is supplied from Somalia (81.60%), U Arab Emts (17.90%) and Thailand (0.50%). Germany (29.03%), Trinidad (22.07%), Mexico (8.84%), Belgium (7.27%), France (7.09%), Australia (6.11%) and U S A (5.95%) are the major export destinations (Table 42).

Table 42. Export and import of olibanum during 2016-17

Country	Quantity (tons)	Value (₹ lakh)	Value (US million dollars)	Share (%)
Export				
Germany	13.00	47.89	0.07	29.03
Trinidad	24.00	36.40	0.05	22.07
Mexico	6.00	14.58	0.02	8.84
Belgium	3.50	11.99	0.02	7.27
France	3.35	11.70	0.02	7.09
Australia	0.56	10.07	0.01	6.11
U S A	4.00	9.81	0.01	5.95
Canada	1.51	7.33	0.01	4.44
Guatemala	12.00	6.01	0.01	3.64
Others (7)	6.64	9.16	0.02	5.56
Total	74.56	164.94	0.24	100.00
Import				
Somalia	50.00	339.85	0.51	81.60
U Arab Emts	10.00	74.53	0.11	17.90
Thailand	0.60	2.07	0.00	0.50
Total	60.60	416.45	0.63	100.00



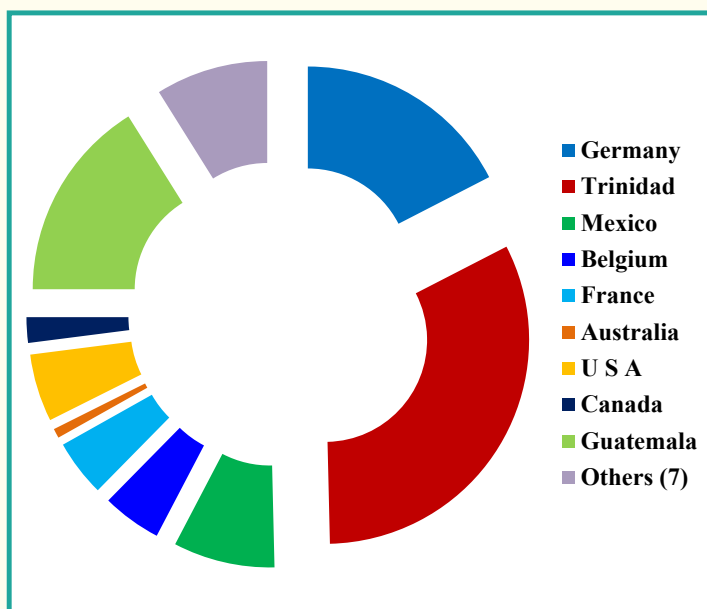


Figure 40. Destination-wise quantitative share of the olibanum exported from India

Myrrh

Myrrh is used raw or crushed and mixed with oil to make perfume. *Myrrh* comes from a small, thorny tree (*Commiphora myrrha*). The growers make a small cut in the bark, from where the resin would leak out. It is then collected and stored for about three months until it hardens into fragrant globules. *Myrrh* oil, which is steam distilled directly from the *myrrh* resin, has an aroma that is woody, earthy and a bit balsamic. Also, *myrrh* is occasionally used as a flavoring agent.

International trade of myrrh

In India, *myrrh* is supplied from Somalia (66.16%), U Arab Emts (27.12%) and Kenya (6.72%). Iraq (57.24%), Italy (38.40%), Turkey (3.77%) and UK (0.35%) are the major export destinations of *myrrh* (Table 43).

Table 43. Export and import of *myrrh* during 2016-17

Country	Quantity (tons)	Value (₹ lakh)	Value (US million dollars)	Share (%)
Export				
Iraq	0.3	4.86	0.01	57.24
Italy	0.2	3.26	0.001	38.40
Turkey	0.005	0.32	0.001	3.77
U K	0.003	0.03	0.001	0.35
Hungary	0.002	0.02	0.001	0.24
Total	0.51	8.49	0.01	100.00
Import				
Somalia	41.33	247.75	0.37	66.16
U Arab Emts	8.3	101.56	0.15	27.12
Kenya	28.3	25.14	0.04	6.72
Total	77.93	374.45	0.56	100.00



Dikamali (*Gardenia gummiferra*)

G.gummiferra (*Dikamali*) family Rubiaceae is the gum resin obtained from the leaf buds of a shrubby plant by making a cut on the stem or branches. It is geographically distributed in all districts of south India, Burma, Bangladesh, Konkan region, North Kanara, and Malabar Coast. Other names are *Dikamali*, *Gandharaj*, *Hingunadika*, *Nadihingu*, *pindava*, etc. It contains 89.9% resin and 0.1% oil and gardenin, a coloring agent and annual production is 10-15 tons. Producers' price in the market is ₹100-120 and retail price of processed product is about ₹1200-1400.

D. NATURAL RESINS AND GUMS (NRGs)

NRG production level during 2016-17 was estimated to be comparatively lower (~625769 tons) than previous year (Table 44). Other resins and gums production have increased 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 44. Total NRG production (quantity in tons)

Name of product	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	Average	% share
Guar gum*	744369.67	819057.00	1130247.33	1094989.33	938403.67	601739.67	888134.45	97.01
Lac	17900.00	19577.00	21008.00	16978.00	18746.00	16352.00	18426.83	2.01
Pine resin	8514.20	8361.30	6875.30	6699.30	5726.10	5772.90	6991.52	0.76
Karaya gum	284.90	211.90	128.76	83.23	100.35	145.00	159.02	0.02
Dhawda gum	147.24	379.89	448.41	295.09	194.00	240.00	284.11	0.03
Other gums	716.45	552.16	567.26	332.62	389.48	380.00	489.66	0.05
Other resins and gums	691.10	1082.50	975.10	1189.76	980.00	1140.00	1009.74	0.12
Grand Total	772623.56	849221.75	1160250.16	1120567.33	964539.60	625769.57	915495.33	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

The total export of natural resins, gums and gum-resins during the year 2016-17 was 335378.07 tons valued ₹3108.12 crores and total import was 109764.64 tons valued ₹137165.89 crores. A comparative increase of 23.09% was observed in the volume of total NRG export during 2016-17 (Table 45 & Figure 41).

Table 45. Trends in export of NRGs and its share in total exports (value in Crores)

Year	Total Exports	Agricultural Exports	NRG Export	Share of Agricultural Exports in Total Exports (%)	Share of NRG Exports in Total Exports (%)
2010-11	1136964.22	113046.58	3086.23	9.94	0.27
2011-12	1465959.31	182801.00	16966.36	12.47	1.16
2012-13	1634318.29	227192.61	21761.19	13.90	1.33
2013-14	1905011.00	262778.54	12170.55	13.79	0.64
2014-15	1896445.47	239681.04	9632.71	12.64	0.51
2015-16	1716378.05	215396.55	3439.96	12.55	0.20
2016-17	1849433.55	226651.91	3108.13	12.26	0.17



Due to deceleration in price, particularly for *guar* gum, the total value of NRG export was less than previous year. Details of export and import of natural resins, gums and gum-resins is presented in the Table 46.

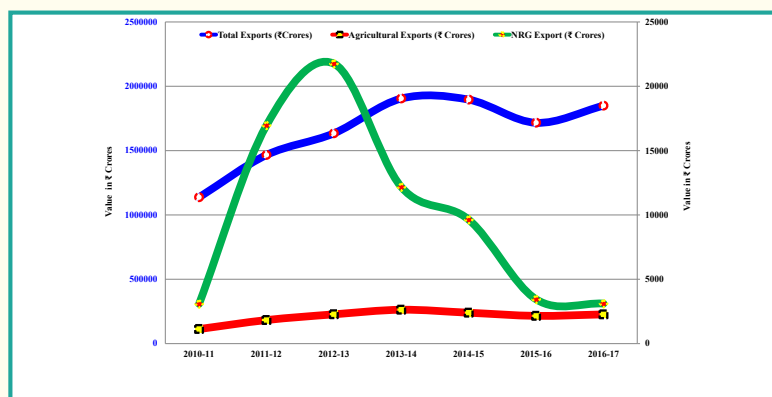


Figure 41. Trends in value of Total export, Agricultural export (Primary axis) and NRG exports (Secondary axis).

Table 46. Total NRG export from and import in India during 2016-17

Sl. No.	Name of product	Export		Import	
		Quantity (tons)	Value (₹ Lakh)	Quantity (tons)	Value (₹ Lakh)
A. Natural resins					
	Copal	2.00	1.08	1838.03	1322.93
	Dammar batu	5.80	11.57	14521.98	5156.79
	Mastic gum	0.14	0.12	3.75	20.32
	Gum rosin	142.64	179.71	43098.06	39591.01
	Lac	7241.00	20690.00	148.00	530.00
	Other resins	169.40	191.55	117.44	148.70
	Total	7560.98	21074.03	59579.26	46239.75
B. Gums					
1.	African gum	395.07	1350.28	25.66	12.87
2.	Asian gum	0.35	4.94	0.00	0.00
3.	Gum arabic	5450.32	2848.47	46242.34	28064.71
4.	Guar gum refined split	41177.93	27294.55	0.00	0.00
5.	Guar gum treated and pulverized	276888.84	246336.16	66.85	219.73
6.	Gum Karaya (Indian tragacanth)	186.90	630.10	912.55	784.23
7.	Tragacanth (Adracanth)	1.20	9.82	10.00	0.29
8.	Xanthum gum	2.60	9.17	56.88	80.40
9.	Other natural gums	2302.64	3394.38	648.85	1321.07
	Total	326405.85	281877.87	47963.13	30483.30
C. Gum resins					
10.	Asafoetida	1190.32	5738.40	1322.70	58347.01
11.	Myrrh	0.51	8.49	77.93	374.45
12.	Olibanum or frankincence	74.56	164.94	60.60	416.45
13.	Other gum resins	145.85	1949.18	761.02	1304.93
	Total	1411.24	7861.01	2222.25	60442.84
	Grand Total	335378.07	310812.91	109764.64	137165.89

Source: DGCIS, SHEFEXIL & APEDA Annual Reports.

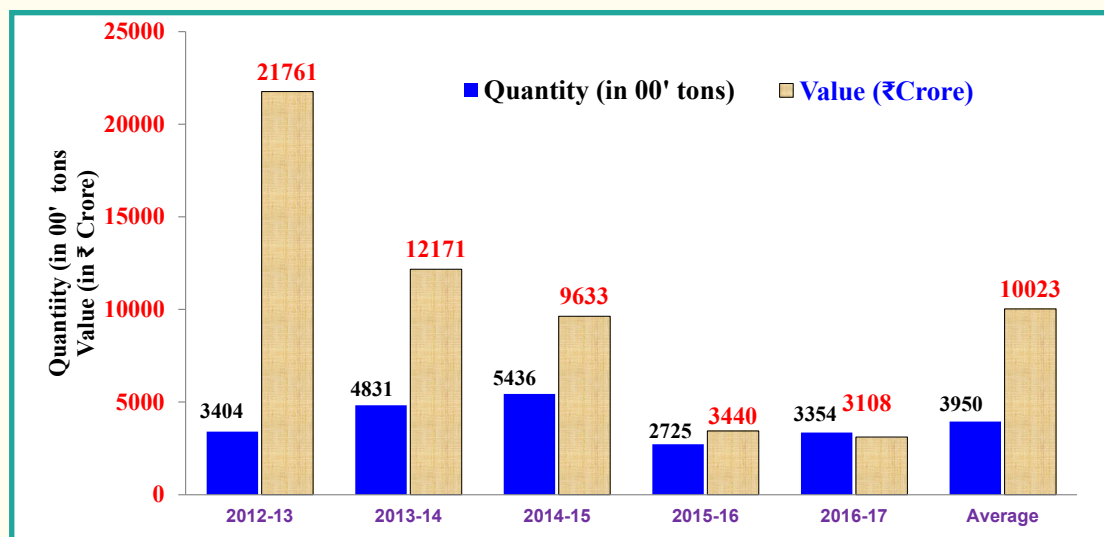


Figure 42. Trend in export of natural resins and gums from India during last five years

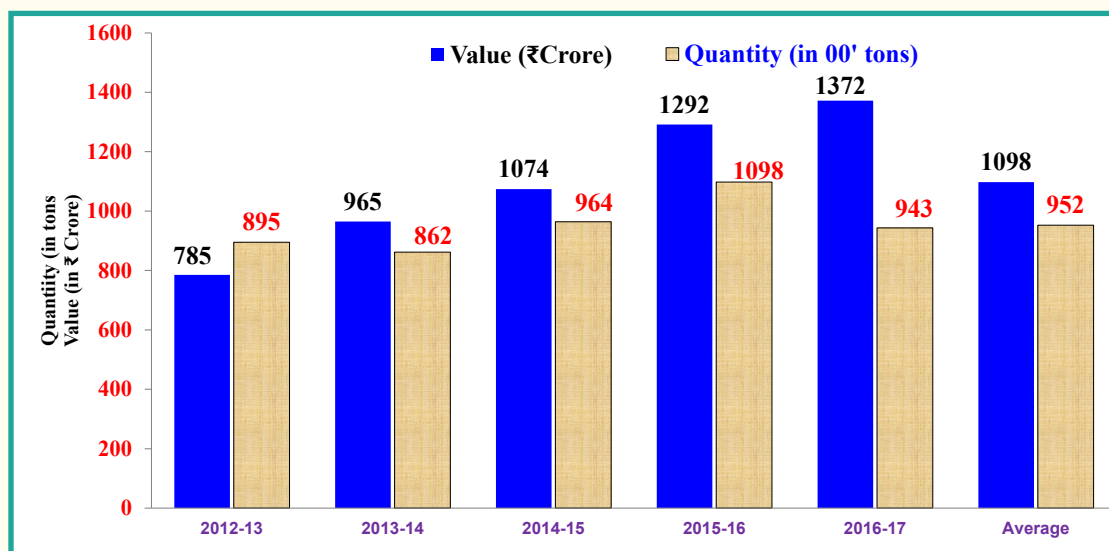


Figure 43. Trend in import of natural resins and gums in India during last five years

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%. Consequently, export value of NRGs has also shown increasing trend with an annual compound growth rates of 22.04%. 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%). Trend in export of natural resins and gums from India and import in India during last five years is presented in Figure 42 and Figure 43, respectively.



POLICY INTERVENTIONS

To provide fair prices of NWFPs which differ widely state to state and to prevent exploitation of the poor tribals; Minimum Support Price (MSP) was introduced. The practices adopted by different states for fixation of prices for different Non Wood Forest Products (NWFPs) were on the basis of market prices by reducing all the overheads and the second methodology for arriving at procurement price was to follow cost plus method in which cost of collection was needed to be calculated for NWFPs in different states. Therefore, government has taken the initiatives under the scheme for NWFPs.

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

A Pricing Cell was constituted in pursuant to the Ministry of Tribal Affairs, Government of India and notified vide TRIFED, to recommend MSP for Minor Forest Produce under the scheme “Mechanism for marketing of Minor Forest Produce through MSP and development of Value Chain for MFP”. To determine 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), Ranchi. 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 recommendations were made in the context of price stabilizing policy for NWFPs.

A. Minimum Support Price of gum *karaya* during 2014-15

Gum *karaya* is procured from gum pickers in three grades and procurement prices are also announced grade wise. Despite announcement of MSP 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 felt it appropriate to determine MSP on the basis of the cost of production as calculated by ICAR-IINRG plus 10 % increase thereon. Accordingly, the Pricing Cell recommended MSP of ₹ 108/kg for gum *karaya* Grade-III for the current procurement season.

B. Minimum Support Price of lac for the year 2014-15

Major quantity of lac is available in the state of Jharkhand followed by Chhattisgarh, Madhya Pradesh and 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.

C. Minimum Support Price of lac for the year 2015-16

The Pricing Cell recommended enhancing the current MSP by 10 %. Pricing Cell had recommended a MSP of ₹230 and ₹320/kg for *rangeeni* and *kusumi* lac, respectively.

D. Minimum Support Price of lac for the year 2016-17

During the current year, the lac growers have used broodlac of July 2015 crop in their cultivation when the prices were ranging between ₹150-200/kg, hence during harvesting season in December and January cost of production of lac may be comparatively lower than previous season. Pricing Cell had recommended a Minimum Support Price (MSP) of ₹100 and ₹150/kg for *rangeeni* and *kusumi* lac, respectively for 2016-17 crops.

E. Minimum Support Price of lac and gum *karaya* for the year 2017-18

During the current year, the lac growers have used broodlac of July 2015 crop in their cultivation when the prices were ranging between ₹150-220/kg, hence during harvesting season in December



and January cost of production of lac may be comparatively lower than previous season. Pricing Cell had recommended a Minimum Support Price (MSP) of ₹100 and ₹150/kg for *rangeeni* and *kusumi* lac, respectively for 2017-18 crops. Further, committee advocated increasing the MSP. Recommended MSP for gum *karaya* was ₹108/kg during the current procurement season. Procurement of scrapedlac under the scheme is presented in Table 47.

Table 47: Procurement of scrapedlac under the scheme (*Quantity in tons and Value Rs. in Lakh*)

Name of the state	2014-15		2016-17				Total	
	Kusumi		Kusumi		Rangeeni			
	Qty	Value	Qty	Value	Qty	Value	Qty.	Value
Chhattisgarh	0.0	0.0	350.6	1208.1	101.2	250.9	451.8	1459.0
Jharkhand	0.0	0.0	0.0	0.0	3.9	5.9	3.9	5.9
Gujarat	19.5	6.2	2.7	0.5	0.0	0.0	22.2	6.7
All India	19.5	6.2	353.3	1208.6	105.1	256.8	477.9	1471.6

Source: TRIFED, New Delhi



CONCLUSIONS

Under the capacity building and skill development programs, stakeholders got benefited directly and farm level adoption was observed. Due to increase in awareness through skill development programs for the beneficiaries could be promising strategy for enabling them to maximize the utilization of available natural resources including lac host trees, trees for gum exudates, rainfed areas of western arid zones for guar crop and plateau region for *Cassia tora* and tamarind seeds. Strengthening of value chain through policy interventions like MSP and farmer-industry linkages through village level organizations will be helpful to harness the full potential of available resources. This may be helpful to generate gainful employment on the one hand for checking migration while also providing quality output to the hands of the consumer.

New and young entrepreneurs have entered in lac sector with big investments for production of high value products like lac coating formulations, Aleuritic acid and isoambrettolide. Value addition in lac based products has an encouraging market scenario as the export of Aleuritic acid is increasing since last two years. 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. Although resins discussed have proved to be popular alternative or complementary medicine used in the treatment of many diseases, clinical trial evaluation of these claims using currently accepted protocols is needed. The reported resins offer huge potential as a possible pharmacological application but its necessary a further investigation to verify whether purified compounds isolated may have better therapeutic potential as compared to crude extracts. These new chemicals will serve to enhance the continuous usefulness of higher plants and their products as renewable resources of chemicals.

Major gums and resins of international commerce produced and traded in and from India include *guar* gum, lac, gum *karaya*, gum *arabic* from *Acacia* species, tamarind gum powder, psyllium gum, *Cassia tora* and *myrrh*, asafetida, rosin and olibanum from *Commiphora* species. The volume of export of natural resins and the volume of import of natural resins was also decreased slightly in 2016-17. Consequently, the value of export and import for natural resins was decreased by 1% and 5%, respectively. The volume of export of natural gums was increased by 23.2% and the volume of import of natural resins was also increased by 14.8% in 2016-17. But, the value of export for natural gums decreased by 11.1%. Similarly, the volume of export and import of natural gum resins was increased a little in 2016-17. Consequently, a little increase in the value of export of natural gum resins was observed in 2016-17. Overall, the volume of export of NRGs was increased by 23.09% and the volume of import of natural resins was also increased by 13.88% in 2016-17. But, the value of export for natural resins decreased by 12.18% in similar trend of previous year.

Enhancing the offer of Indian market products and increasing their role in the rural economy could help to reduce the costs of forest protection. A well-structured forest economy that is able to provide stable flow of incomes can provide a fundamental set of public non-market services and social values to both local people and the whole community. Understanding the true value of natural resources, for both land users and policymakers, is an essential step for promoting their protection and sustainable use. Since markets do not reflect all values flowing from NWFPs, further research is needed to better understand the link between ecosystem functioning and the delivery of services, as well as their appropriate economic evaluation. As a final point, we are aware that synergies and trade-offs exist between market products and nonmarket services, as well as among different ecosystem services. 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.



Annexure I. Sticklac production scenario in India during 2016-17 (in tons)

Name of states / Districts		<i>Baisakhi</i>	<i>Katki</i>	<i>Jethwi</i>	<i>Aghani</i>	Total
I.	Andhra Pradesh	50	35	2	1	88
II.	Assam	65	40	0	0	105
III.	Chhattisgarh					
1.	Bastar	30	10	30	50	120
2.	Bilaspur	80	75	25	50	230
3.	Dhamtari	45	20	35	30	130
4.	Durg	15	15	0	0	30
5.	Janjgir-Champa	50	20	15	40	125
6.	Kanker	50	50	170	200	470
7.	Korba	200	170	125	210	705
8.	Mahasamund	40	40	5	20	105
9.	Raigarh	40	50	15	30	135
10.	Raipur	10	5	40	75	130
11.	Rajnandgaon	80	50	15	25	170
12.	Surguja	105	40	8	0	153
13.	Others	55	65	20	50	190
Total		800	610	503	780	2693
IV.	Gujarat	10	2	5	5	22
V.	Jharkhand					
14.	Bokaro	0	0	25	10	35
15.	Chatra	0	0	0	5	5
16.	Dhanbad	0	0	4	1	5
17.	Deoghar	0	0	10	0	10
18.	Dumka	0	0	5	0	5
19.	East Singhbhum	0	0	5	1	6
20.	Giridih	40	10	0	70	120
21.	Garhwa	5	3	0	0	8
22.	Gumla	10	6	520	800	1336
23.	Hazaribag	0	0	0	65	65
24.	Jamtara	0	0	15	0	15
25.	Khunti	80	75	470	690	1315
26.	Latehar	5	5	2	120	132
27.	Lohardaga	0	0	30	5	35
28.	Palamau	10	15	0	80	105
29.	Ranchi	200	125	1245	1140	2710
30.	Saraikela Kharsanwa	10	5	45	40	100
31.	Simdega	20	55	1040	1000	2115
32.	West Singhbhum	50	5	300	435	790
33.	Others	0	0	11	3	14
Total		430	304	3727	4465	8926
VI.	Madhya Pradesh					
34.	Annappur & Shahdol	2	5	4	0	11
35.	Balaghat	400	390	10	2	802
36.	Chhindwada	15	20	10	2	47



Name of states / Districts	<i>Baisakhi</i>	<i>Katki</i>	<i>Jethwi</i>	<i>Aghani</i>	Total
37. Dindori	75	20	10	1	106
38. Hosangabad	10	25	10	1	46
39. Mandla	100	60	5	20	185
40. Narshinghpur	1	20	0	1	22
41. Seoni	440	410	10	5	865
42. Others	100	60	10	20	190
Total	1143	1010	69	52	2274
VII. Maharashtra					
43. Bhandara	25	30	0	0	55
44. Chandrapur	20	30	0	0	50
45. Garhchiroli	65	40	5	5	115
46. Gondia	300	355	0	0	655
Total	410	455	5	5	875
VIII. Meghalaya (Garo hills)	10	10	0	0	20
IX. Odisha					
47. Balasore	1	2	8	5	16
48. Keonjhar	1	0	10	10	21
49. Koraput	1	1	10	0	12
50. Mayurbhanj	1	2	10	35	48
51. Nabarangpur	2	1	30	50	83
52. Sundergarh	9	0	55	75	139
53. Others	5	5	15	10	35
Total	20	11	138	185	354
X. Uttar Pradesh	10	5	0	0	15
XI. West Bengal					
54. Bankura	10	80	5	10	105
55. Midnapur	40	240	5	10	295
56. Purulia	15	230	25	120	390
57. Others	20	130	10	30	190
Total	85	680	45	170	980
Grand total	3033	3162	4494	5663	16352

Annexure II. Lac producing areas in the country

Sl. No.	Name of State/ District	Major lac producing areas
1	Andhra Pradesh	
2	Adilabad	Utnoor
3	Vishakhapatnam	Paderu
4	Assam	
5	Kamrup	Boko
6	Karbi-Anglong	Amtreng, Baithalansu
7	Marigaon	Nellei
8	Nagaon	Amsoi, Hojai
9	Bihar	
10	Gaya	Raniganj
11	Jehanabad	Malichak
12	Chhattisgarh	
13	Balrampur	Chando, Dharmi, Wandrafnagar
14	Bastar	Keshkal



Sl. No.	Name of State/ District	Major lac producing areas
15	Bilaspur	Gaurella, Kota, Lorami, Pendra
16	Dhamtari	Gatta Silli, Nagri, Sihawa
17	Durg	Balod, Daudi, Dondi-Lohara, Kusumkasa
18	Gariyaband	Amlipadar, Chhaila, Chhura Gariyaband, Indagaon, Mainpur, Udanti
19	Janjgir-Champa	Sakti, Saragaon
20	Kanker	Antagarh, Bhanupratapur, Biragaon, Kondagaon, Korar, Narharpur, Sambalpur
21	Korba	Bhaisama Bazar, Chaitama, Chhuri, Haldi Bazar, Kartala, Katghora, Korbi, Madanpur, Pali, Pasan, Pasarkhet
22	Korea	Bhartarpur, Kusmi
23	Mahasamund	Bagbahara, Basana, Khalari, Mahasamund, Pithora, Tendukona
24	Narayanpur	Narainpur
25	Raigarh	Dharmjaigarh, Lailunga, Pathalgaon, Tamnar
26	Raipur	Abhanpur
27	Rajnandgaon	Aawadhi, Bharitola, Khardi, Manpur, Mohala-chowki
28	Sarguja	Chalgi, Mainpat, Pasta, Pratappur, Premnagar, Raghunathnagar, Ramanujanj
29	Gujarat	
30	Bharuch	Bharuch, Hansot, Jhagadia, Netrang and Vagra
31	Panchmahal	Dakor, Godhara, Ghoghamba, Nadiad and Santrampur
32	Vadodara	Chhota Udepur, Devhant, Jambaguda, Jatpurpavi, Jhonjh, Kawant, Keori, Kundal Ghata, Tejgad and Zoz
33	Jharkhand	
34	Bokaro	Petarvar
35	Chatra	Tandwa
36	Dhanbad	Baghmara, Baliapur, Nirsa, Topchanchi, Tundi and Purbi Tundi
37	Deoghar	Devipur, Mohanpur, Sarwan, Sarath and Margomunda
38	Dumka	Gopikandar, Kathikund, Masaliya, Ramgarh and Shikaripara
39	East Singhbhum	Boram, Chakulia, Dhalbhumgarh, Gurabandha Musabani, Potka and Patamda
40	Giridih	Bagodar, Bengabad, Dumri, Pirtand, Suriya and Tisri
41	Garhwa	Bargarh, Garhwa, Godarmana, Rakshi, Ramganga, Ramkonda, Ranka
42	Gumla	Chainpur, Dumari, Kanshir, Palkot, Patratoli, Raidih
43	Hazaribag	Barkagaon, Barkatha, Bishnugarh, Chalkusha, Chouparan Churchu, Dadi, Daru, Ichak, Katkamdag
44	Jamtara	
45	Khunti	Karra, Murhu, Rania, Soeko Torpa, Tapkara
46	Latehar	Balumath, Barwadih Brahmani, Chandwa, Garu Latehar, Manika, Sarju, Satbarwa
47	Lohardaga	
48	Palamu	Matalong, Panki, Raj Chaipur
49	Ranchi	Angara, Banta, Birbanki, Bundu, Jonha, Namkum, Ormanjhi, Silli, Maranghada, Sonahatu, Tamar
50	Saraikela Kharsanwa	
51	Simdega	Bano, Hating hode, Jaldega, Kolebira, Lachragarh
52	West Singhbhum	Anandpur, Bandgaon, Baskata, Chaibasa, Chakradharpur, Goelkera, Lodai, Manoharpur, Sonuwa, Toklo
53	Madhya Pradesh	
54	Anuppur & Shahdol	Jaitahari, Keshwahi, Kotma, Venkatnagar
55	Balaghat	Baihar, Katangi, Lalbarra, Lamta, Langi, Parashwada, Waraseoni



Sl. No.	Name of State/ District	Major lac producing areas
56	Chhindawada	Damoa
57	Dindori	Bazak, Bhanupur, Karanjia, Ramnagar, Rampur
58	Hosangabad	Bankhedhi, Babai, Daggrai, Darawpadaw, Hapa, Jonahata, Kekra, Lokamti, Pipariya
59	Mandla	Bichhia, Chabbi, Ghughari, Kalpi, Mahegaon, Mavai, Nainpur, Narainganj, Navas-Bablia
60	Narshinghpur	Chichli, Godarwara, Kalakhar, Kalyanpur, Nayakheda, Salechauka
61	Seoni	Barghat, Ghansore, Kahani, Kanewara, Keolari, Khamaria, Khari
62	Shahdol	Burhar, Jaitpur, Sohagpur
63	Maharashtra	
64	Bhandara	Gobarwahi, Nakadongri
65	Chandrapur	Bandh, Navargaon
66	Garhchiroli	Allapalli, Bamragarh
67	Gondia	Amgaon, Chopa, Goregaon, Hirapur, Kampta, Kati, Kotjamura, Kurodhi, Salekasa, Tiroda
68	Meghalaya	
69	Garo Hills	Damra, Dodno, Nongpoh, Tura
70	Odisha	
71	Balasore	Haldipada, Jaleshwar, Nilagiri
72	Keonjhar	Telkoi
73	Koraput	Ramgiri
74	Mayurbhanj	Jashipur, Kaptipada, Karanjia, Kusumi, Padampokhari, Sarat, Thakurmunda, Udala,
75	Nabarangpur	Chandahandi, Raighar
76	Sundergarh	Gurundia, Khandadhar, Kutra, Rajgangpur
77	Uttar Pradesh	
78	Sonbhadra	Doodhi
79	Allahabad	Koraon, Meja
80	West Bengal	
81	Bankura	Idpur, Khatra, Raipur, Ranibandh,
82	Midnapur	Katai, Kuti, Moyna, Panskurah, Ramnagar, Tamluk
83	Purulia	Ayodhya Pahar, Bagh Mandi, Balarampur, Jhalda, Kashipur, Kutidih, Raghunathpur, Tulin

Annexure III. Gums producing districts and areas

Sl. No.	Name of State/ District	Major gum producing areas
1	Andhra Pradesh	
2	Adilabad	Jannaram, Kamma Reddy, SK Nagar and Utnoor
3	Chittur	Chittur, Kaddapa and Nellore
4	East Godavari	Addategella, Maredumilli, Rajavomma Kangi and Rampachodavaram
5	Khammam	Bhadrachalam, Chintoor, Dammapeta and Kukunaru
6	Mahboobnagar	Mannanoele, Nanjaria and Pedadornala
7	Srikakulam	Pathattanam and Setampeda
8	Visakhapatnam	Arku, Chintapalli, GKVIDHI, G.Murugala, Kashipatnam, Koyuru, Munchingput, Paderu and Petabayallu
9	Vizianagram	Gummalaxmipuram, Parvatipuram and Salur
10	Warangal	Etrunagram, Mulug and Narshimhpada



Sl. No.	Name of State/ District	Major gum producing areas
11	West Godavari	AR Puram
12	Chhattisgarh	
13	Balrampur	Chando, Dharmi
14	Bastar	Jagdapur, Keshkal
15	Bilaspur	Dindori, Lormi, Mugeli, Ratanpur and Takhtpur
16	Dhamtari	Gatta Silli, Nagri, Sihawa
17	Gariyaband	Amlipadar, Chhaila, Chhura Gariyaband, Indagaon, Mainpur, Udanti
18	Janjgir-Champa	Sakti, Saragaon
19	Kanker	Antagarh, Bhanupratapur, Biragaon, Kondagaon, Korar, Narharpur, Sambalpur
20	Korba	Bhaisama Bazar, Chaitama, Chhuri, Haldi Bazar, Kartala, Pali, Pasan, Pasarkhet
21	Korea	Bhartarpur
22	Mahasamund	Bagbahara, Basana, Khalari, Pithora
23	Narayanpur	Narainpur
24	Raigarh	Khamariya, Dharmjaigarh, Manendragarh Milupara, Pathalgaon
25	Raipur	Abhanpur
26	Rajnandgaon	Khardi, Manpur, Mohala-chowki
27	Sarguja	East Sarguja, South Sarguja
28	Sukma	Sukma
29	Bijapur	Bijapur, Bairamgarh, Bhopalpatnam, Usoo
30	Dantewada	Dantewada, Geedam, Kuwakonda, Katekalyan
31	Gujarat	
32	Balsar	Dharampur, Malanpada and Pangarbari
33	Banskantha	Ambaji, Pata and Virampur
34	Bharuch	Jaghadiya and Jankhawav
35	Dahod	Baria and Sagtala
36	Dang	Ahwa and Waghai
37	Kuchachh	Bhachau, Bhirandiyara, Bhuj, Dwarika, Mandvi, Nakhatrana and Rapar
38	Narmada	Dediapada, Mandvi and Rajpipla
39	Navsari	Ankalachh, Bansda and Chikhali
40	Panchmahal	Dakor, Ghoghamba, Nadiad and Santrampur
41	Sabarkantha	Bhiloda, Choriwada Modasa and Posina
42	Vadodara	Chhota Udepur, Devhant, Jambaguda, Jatpurpavi, Kawant, Tejgadhd and Zoz
43	Jharkhand	
44	Chatra	Lawalang, Pratappur and Kanti
45	Garhwa	Ramkanda and Bhandaria
46	Gumla	Dumari, Kanshir, Palkot, Patratoli, Raidih
47	Khunti	Murhu, Soeko Rania, Tapkara
48	Latehar	Garu, Mahuadar, Herhanj, Balumath, Barwadih, Lesliganj, Chhipadohar and Richughutu
49	Palamu	Daltonganj, Panki, Chhatarpur



Sl. No.	Name of State/ District	Major gum producing areas
50	Ranchi	Angara, Bundu, Jonha, Sonahatu, Tamar
51	West Singhbhum	Chakradharpur
52	Madhya Pradesh	
53	Balaghat	Kochewahi, Baihar, Lamta, Langi, Paraswada
54	Betul	Savani
55	Chhindawada	Amarwada, Damua, Pataalkot
56	Hosangabad	Pipariya
57	Mandla	Pindarai, Bamhani, Mohgaon, Lingapondi, Bichhia, Chabbi
58	Narshinghpur	Chichli, Godarwara, Kalakhar, Kalyanpur, Nayakheda, Salechauka
59	Seoni	Bhimgarh, Chhopara, Dhuma
60	Maharashtra	
61	Bhandara	Gobarwahi, Nakadongri
62	Chandrapur	Mul
63	Garhchiroli	Armon, Wadsa, Desai ganj
64	Gondia	Salekasha, Amgaon, Goregaon, Dhapewada, Tiroda, Navegaon Bandh
65	Wardha	Dhagabhawan, Navargaon, Hingni, Bordhara, Karanja range
66	Odisha	
67	Balasore	Haldipada, Jaleshwar, Nilagiri
68	Keonjhar	Telkoi
69	Koraput	Ramgiri
70	Mayurbhanj	Jashipur, Kaptipada, Karanjia, Kusumi, Padampokhari, Sarat, Thakurmunda, Udala,
71	Nabarangpur	Chandahandi, Raighar
72	Sundergarh	Gurundia, Khandadhar, Kutra, Rajgangpur
73	Rajasthan	
74	Ajmer	Beawar, Kekeri, Kisangarh, Nasserabad, Puskar
75	Alwar	Bansur, Rajgarh, Ramgarh, Thanagazi
76	Churu	Sardarsahar, Sujangarh, Taranagar
77	Jaipur	Amer, Bassi, Chomu, Chaksu, Jamwa Ramgarh, Kotputli, Phagi, Phulera
78	Jhunjhunu	Chirawa, Khetri, Navalgarh
79	Jodhpur	Bilara, Luni, Phalodi, Shergarh
80	Nagour	Ladnu, Merta, Parbatsar
81	Pali	Bali, Sojat, Sumerpur
82	Sikar	Fatehpur, Neem-ka-Thana, Ringus, Sri Madhopur
83	Tonk	Niwai, Malpura, Uniara
84	Udaipur	Gogunda, Kotra
85		



Annexure IV. Legal categorization of major gums produced in various states of India

State	MFP Under State Monopoly
Andhra Pradesh	Bamboo, tendu leaves and 25 other MFPs.
Chhattisgarh	Bamboo, tendu leaves, sal seed, myrobalans and gums of kullu, dhawda, khair and babool.
Gujarat	Bamboo, tendu leaves, mhowra flower, mhowra seed, gum karaya and other miscellaneous gums.
Maharashtra	Bamboo, tendu leaves, apta leaves and 33 other MFPs.
Madhya Pradesh	Bamboo, tendu leaves, sal seed, kullu gum and lac resin.
Rajasthan	Bamboo, tendu. State monopoly for other MFPs ceased to exist in 2003.
Odisha	Bamboo and tendu leaves.
Himachal Pradesh	No MFP has been put under State monopoly.
Jharkhand	Tendu leaves.

Source: TRIFED, Ministry of Tribal Affairs, New Delhi





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