

# Trade Scenario of Sandalwood and its valued oil

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**Abstract:** Sandalwood is the fragrant heartwood of some species of genus *Santalum* (Family: Santalaceae). *Santalum album* L. commercially known as East Indian Sandalwood is indigenous to peninsular India. It is naturally distributed in an extent of around 9600 km<sup>2</sup> mainly in Tamil Nadu, Karnataka and Kerala. The essential oil obtained from this wood has occupied a significant place in perfumery industry/market. The value of a Sandalwood tree depends on three important characters (i) volume of heartwood; (ii) concentration and (iii) quality of its heartwood oil. Although Sandalwood is available in other countries, yet Indian Sandalwood has retained its dominance over other sources because of its quality. The warm, sweet, precious wood notes and the non-dominating fixative characteristics of this oil make it an ideal choice for creating wide varieties of perfumes. Due to increased global and domestic demand, and also decrease in supply, Sandalwood prices have skyrocketed. The country's production during 1930s through 1950s was around 4000 tons of heartwood a year, which has now decreased to a meager 500 tons of wood a year or even less approximately, while the price was Rs. 20,000 per tonne in 1980, it increased to Rs. 200,000 per tonne in 1990's; Rs. 400,000 per tonne in 2004 and presently it is around 750,000 per tonne (2014). Export of Sandalwood from India is totally banned except for handicraft pieces of Sandalwood up to 50g weight. International demand for Sandalwood is estimated to be around 10,000 mt/ year. USA and France are the two largest importers of Indian Sandalwood oil and of late imports into the Middle East are increasing. At the same time, it is disheartening to note that the import of Sandalwood oil to India during 2008-09 was as high as 61.1 thousand Kg for reasons unknown. Currently, Sandalwood oil is sold in the market at the rate of Rs.1, 20,000-1, 50,000 per Kg in the market. In this paper, the present status of production and marketing aspects of *S. album* is discussed in detail.

**Keywords:** Export of Sandalwood oil, Indian Sandalwood, Royal Perfume, Sandalwood, Sandalwood Trade, *Santalum album*.

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## I. INTRODUCTION

In India, the heartwood of Sandalwood has divine status. The divine fragrance of the Sandalwood is said to be very pleasing to the almighty; hence it is used in anointing the divine idols in Indian culture. The fragrances of Sandalwood and the religious life of most of the Indians can hardly be separated as it is required right from sacred ceremonies to the last rites of devote. In India, it's been valued for at least 2,000 years as one of the most sacred trees -- an important part of devotional rituals and also as one of the most important ingredient of a funeral pyre in Hindu culture.

Sandalwood is the fragrant heartwood of some species of genus *Santalum* (Santalace). The genus Santalace is represented by different species all over the World. The widely distributed and economically important *Santalum* genus consists of 16 species, [6] which are xylem-tapping root hemi-parasites with highly valued aromatic heartwood. Amongst these species, East Indian Sandalwood is legendary since the beginning of perfumery and even today in the modern fragrant world. Trade in Sandalwood dates back to the beginning of trading in India.

Major buyers of Sandalwood logs for carving are from Hong Kong and Taiwan. They in turn distribute to China, Japan and Singapore. India produces the best Sandalwood logs for carving due to the fine grain but utilizes it all domestically, as export of *S. album* logs is currently prohibited. Major exporters of top quality logs are Hawaii's, Fiji, Indonesia and Western Australia. Vanuatu, a producer of quality Sandalwood, currently has a 5-year moratorium on all cutting and export. Tonga has also been a producer of quality logs, but its present status is unknown. Papua New Guinea also supplies logs, but they are considered lower quality [1], [14].

## II. BODY OF ARTICLE

### Distribution in India:

East Indian Sandalwood is indigenous to peninsular India. It is naturally distributed in an extent of around 9600 km<sup>2</sup> mainly in Tamil Nadu, Karnataka and Kerala of peninsular India. It has also been introduced into a number of other states in India and has become naturalized in parts of Andhra Pradesh, Rajasthan, Orissa, Maharashtra, Madhya Pradesh and Uttar Pradesh. Sandalwood is capable of growing in different kinds of soils like; sandy, clay, laterite, loamy and black-cotton soil (avoiding water-logged conditions). It is capable of regenerating profusely in the absence of fire and grazing. *S. album* is a small to medium-sized evergreen tree, sometimes reaching up to 18 m in height and 2.5 m in girth. It is a root parasite and successful regeneration (both natural and artificial) requires, amongst other things, suitable host plants. *S. album* attains its maximum heartwood formation at the age of around 30-50 years [12].

### Karnataka:

In Karnataka, *S. album* is spread over 5245 km<sup>2</sup> of area and is abundant in Shimoga, Chikkamagalur, Coorg, Hassan, Mysore, Dharwad, Bangalore, Kolar, Belgaum, Uttar Kannada, Dakshina Kannada, Bellary and Tumkur districts. In Sirsi, Dharwad, Sagar, Shimoga, Mysore and Bangalore divisions the extent of Sandalwood plantations has increased substantially. During 2002-03 to 2005 -06, the Karnataka forest department has raised around 8937 Ha. of plantations of Sandalwood in the state. During 2004-07 and 2007-10 the department has raised around 1079 ha. and 18 ha. of Sandalwood plantations only to a limited extent in the state. As per the forest department annual report the forest department has been raised sandalwood plantation Later during 2010-11; 78 ha; 2011-12; 25 ha; 2012-13; 282 ha; 2013-14; 35 ha; 2014-15; 115 ha [3].

### Tamilnadu:

In Tamilnadu, Sandalwood occurs naturally in the plateau and hill tracks of Salem, Dharmapuri, Erode, Tiruvannamalai, Vellore, The Nilgiris, Villupuram and to certain extent in Madurai, Virudhunagar and Tirunelveli Districts and is spread in an area of around 3040 km<sup>2</sup> [9]. The natural regeneration of Sandalwood tracts is very good in these areas. Sathyamangalm forest division has been raised the sandalwood plantation during 1962-1994 around 205 Ha.

### Kerala:

In Kerala, the Sandalwood bearing forests are mainly located in the Anjanad valley which is on the eastern side of Western Ghats falling in Marayoor forest range and to a limited extend in Arienkavu range of Tenmala forest division in an area of around 15 km<sup>2</sup> [7]. A total number of around 58,414 trees (Tree Density 39.988 trees / Ha) of above 30 cm GBH is found in Marayoor forest division in about 8100 ha. of area thus proving the good natural regeneration in that forest division. In addition, it is estimated that around 1000 trees are also found in private and reserve forests in Kerala [4].

### Andhra Pradesh:

In the drier southern region of Andhra Pradesh natural stand of Sandalwood is spread around 200 km<sup>2</sup> in the districts of Anantapur, Chittoor and Cuddapah, Tirumala hills and Paderu forest division of Arakku valley. In Andhra Pradesh, Sandalwood occurs in sizeable amounts on private lands, institutional lands, village common lands where the status of regeneration is found satisfactory. It is reported that around 3000 Ha. of Sandalwood plantations was raised with partial success [9]. It is also reported that specifically during 1979-85, 1020 Ha and during 1992-97, 2325 Ha of sandalwood plantations were raised in this state. 160 Ha sandalwood plantations were raised in Ananthapur forest circle during 2012-13 [2].

**Orissa:**

Sandalwood occurs in limited patches in Jeypore and Koraput forest divisions of Koraput district and Rayagada division in Orissa state to an extent of around 25 km<sup>2</sup> area [11]. Natural regeneration is high as the climate and other conditions are very conducive for its growth. Indiscriminate felling and lack of protection in the area has led to absence of high girth class trees in the state. It is reported that specifically during 1994-95 around 70 Ha of sandalwood plantations was raised in this state.

**Madhya Pradesh:**

In Madhya Pradesh, Sandalwood spread in the forests of Seoni, Sagar, Sehore, Mandasour, Dewas, Guna and Rewa forest divisions in scattered patches with an area of around 33 km<sup>2</sup> of forest area [7]. Sandalwood was introduced into the natural forests of Madhya Pradesh during 1880 and spread throughout some 3000 ha with medium population density of the species.

**Maharashtra:**

Sandalwoods occur in 33 different districts of Maharashtra spread on an 8 km<sup>2</sup> area both in private and forest areas. It is estimated that good sizable girth standing trees, around 3, 77,997 occur in the state of which around 80% population found in the districts of Ahmadnagar, Latur, Buldhana, Washim, Amravati, Osmanabad, Beed, Pune and Satara.

**Rajasthan:**

A survey conducted during 1970's revealed that dense stands of Sandalwood population in Southern and Eastern parts of Rajasthan state. Latest survey of Sandalwood in the state reveal that the population is depleted, but some stands still exist in Udaipur, Rajasmand, Chittorgarh, Pratapgarh, Pali, Sirohi, Banswara, Dungarpur, Jhalwar, Ajmer and Karoli forest divisions [8].

**West Bengal:**

West Bengal has patches of sandal trees mainly in and around Hirbunth Beat of Khatra range of Bankura South Division. A sandal wood tree attained an average height of 10.20 m and girth of 83.00 cm at the age of 35 years in west Bengal [13].

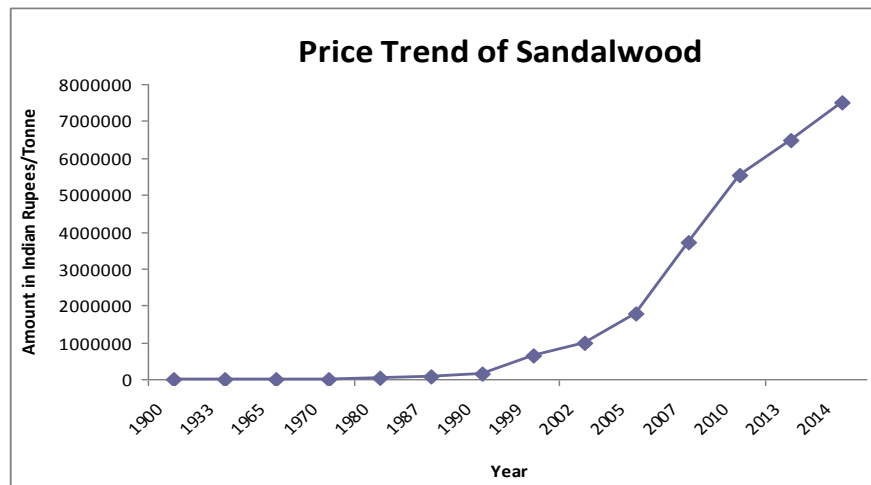
**Chattisgarh:**

Sandalwood was introduced into the natural forests of Chhattisgarh during 1880. Chattisgarh Forest Department is having prime possession of more than 2000 sandalwood mother trees widely available at Ambikapur South Forest Division and Manendragarh Forest Division with them. It is reported that during 2008-09 the department has raised around 100 Ha. and 2010-11 around 15 Ha. of sandalwood plantation has been raised by the department.

**Production in India:**

Ecologically Sandalwood has adapted in various agro-climatic and soil conditions for *in-situ* regeneration. The yield of heartwood varies from locality to locality and the age of the tree. In India, trees of 100 cm girth have been reported to yield between 85 kg and 240 kg of heartwood according to the area from which they come [5] [13]. The East Indian sandalwood tree has become vulnerable in recent years and in an attempt to curb its possible extinction all possible efforts have been taken by all concerned. Sandalwood resource in India is currently threatened mainly because of smuggling, spike disease and forest fire. Smuggling of Sandalwood has created socio-economic and law and order problems in all Sandalwood producing states. The conservation status of Sandalwood in India is also not very good. Fire hazards, spike disease and deforestation have led to a serious decline in wild populations.

The Indian Sandalwood tree is becoming endangered and in an attempt to curb its possible extinction increased interest by both forest departments and private growers towards expansion of plantations has added to the resource building of this valuable tree to certain extent. In its natural zone of occurrence in southern states and other states large tracts of plantations have been raised. The price trend in the international market varies drastically. The Graph-1 below clearly show Price of sandalwood from India during 1990 to 1990 year period averaged less than Rs 10,000/- tonne and the increased trend due to high value of Sandalwood which is mainly because of rising demand in domestic and international markets with skyrocketed price of Rs.75,00,000/- per tonne, presently.

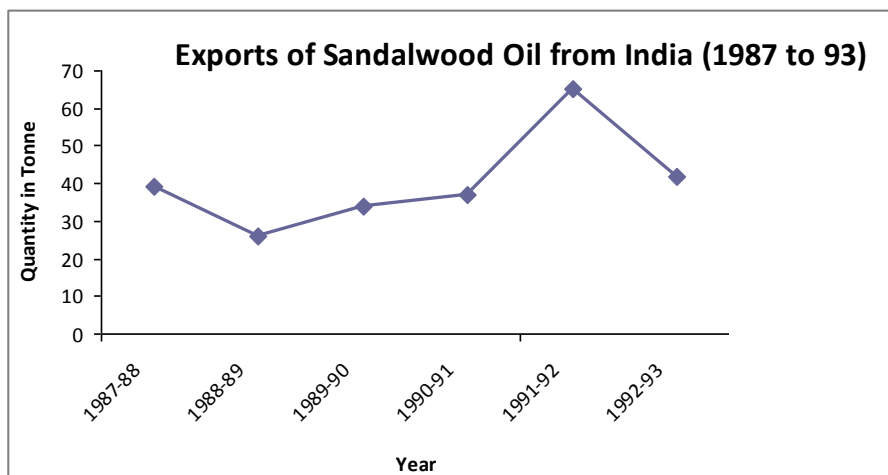


Graph.1: Price trend of Sandalwood

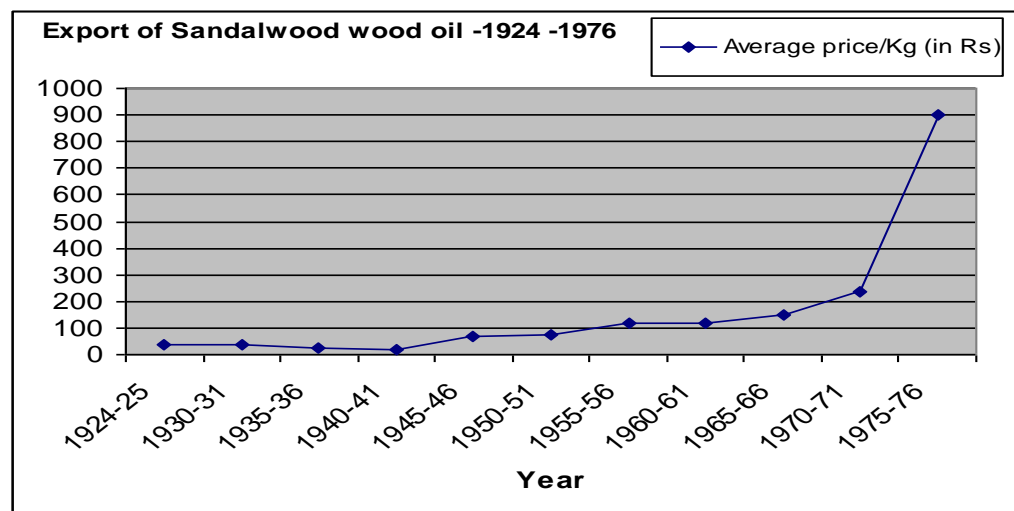
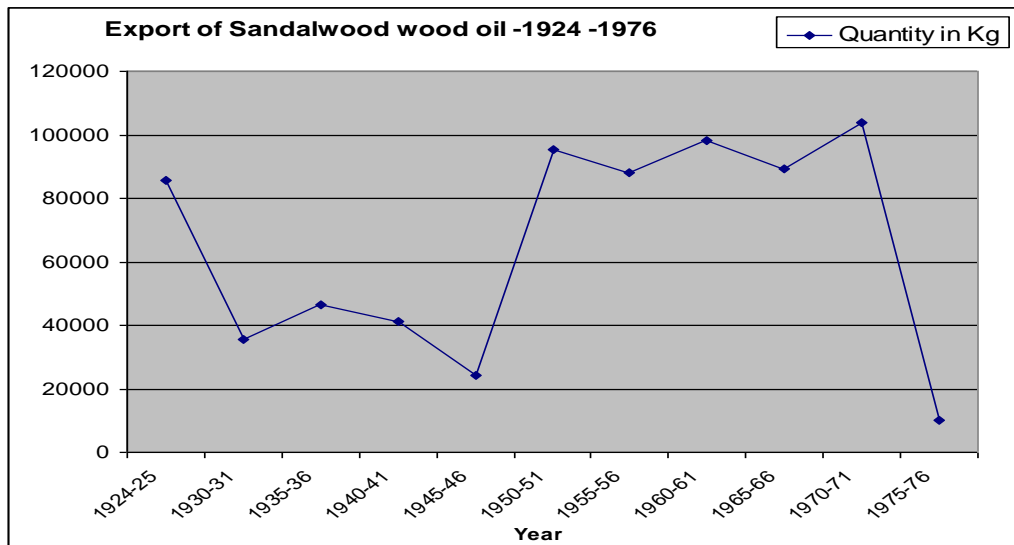
**Export of Sandalwood Oil:**

The warm, sweet, precious wood notes and the non-dominating fixative characteristics of this oil make it an ideal choice for creating wide varieties of perfumes. Besides, the sandalwood oil has antipyretic, antiseptic, antiscabietic and diuretic properties. It is also effective in the treatment of bronchitis, cystitis, dysuria and diseases of the urinary tract. The oil has an important place in the indigenous system of medicine. It is considered as a cure against migraine and Herpes. Sandalwood is used for carving and other artifacts.

India and Indonesia are the two major producers and exporters of Sandalwood oil but reliable production data are not available. Domestic consumption, which is certainly high in India and probably greater than the combined total for the rest of the world, is therefore also difficult to estimate [5]. The data depicted below gives us a glimpse of the quantity exported and the average price. It is seen that during 1924-25 the quantity of oil exported was 85730 kgs. fetching Rs.39.90/Kg. but during 2005-06 the quantity exported is as low as 5700 Kgs. with export value of Rs 913.20 lakhs with average price increased to several folds. Sporadic supply, widespread shortage led the users to resort to cheaper alternative substitute oil/synthetics. Australian Sandalwood oil, African Sandalwood oil, West Indian Sandalwood oil, *Santalum yasi* oil and a host of synthetic Sandalwood aroma chemicals are used as substitutes for *S. album* oil. But none of them is a perfect match to the natural oil of *S. album* in its fragrance. Graph 2 shows clearly the exports from India of *S. album* oil during a 6 year period 1987/88–1992/93 averaged 40.5 metric tonnes [5]. Graph 2, 3 & 4 shows the flexible of the sandalwood oil export during 1924-1976, 1987-1993 & 1997- 2014 in the market and Graph 5 shows the import of sandalwood oil is increasing day by day in the Indian market. International demand for *S. album* oil exceeds supply, and prices continue to rise. Currently, Sandalwood oil is sold in the market at the rate of Rs.1, 20,000-1, 50,000 per kg.

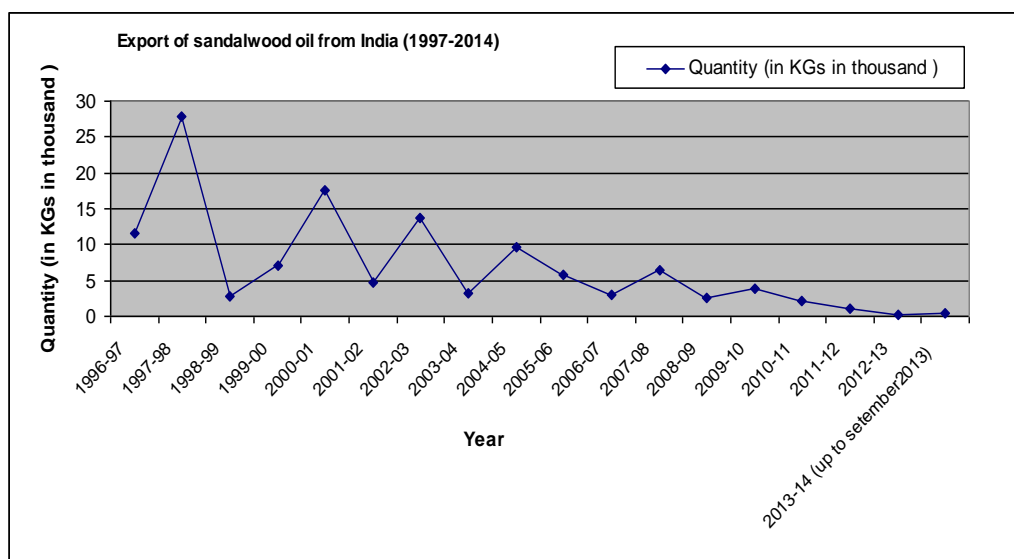


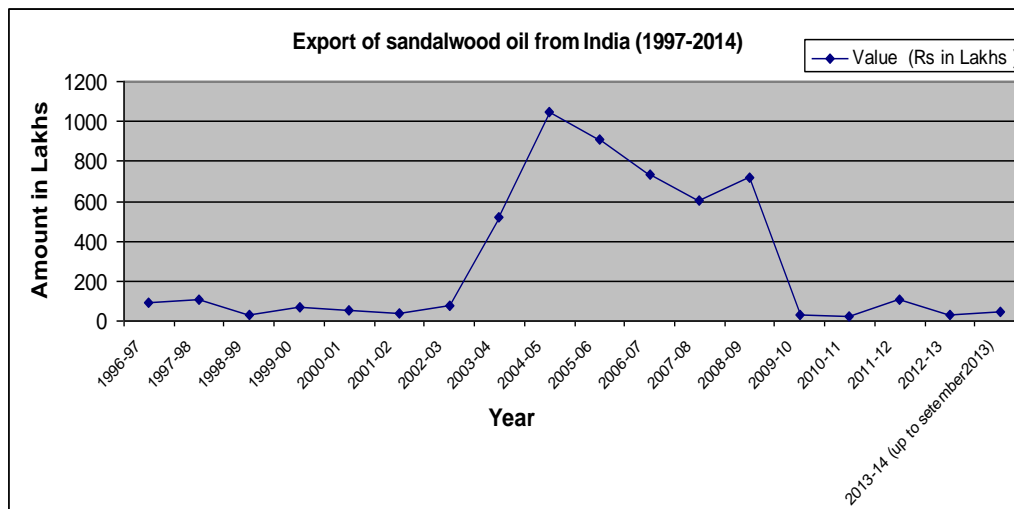
Graph.2: Export and Export of Sandalwood oil -1987-1993.



Source: B.K.C.Rajan (1994) [10].

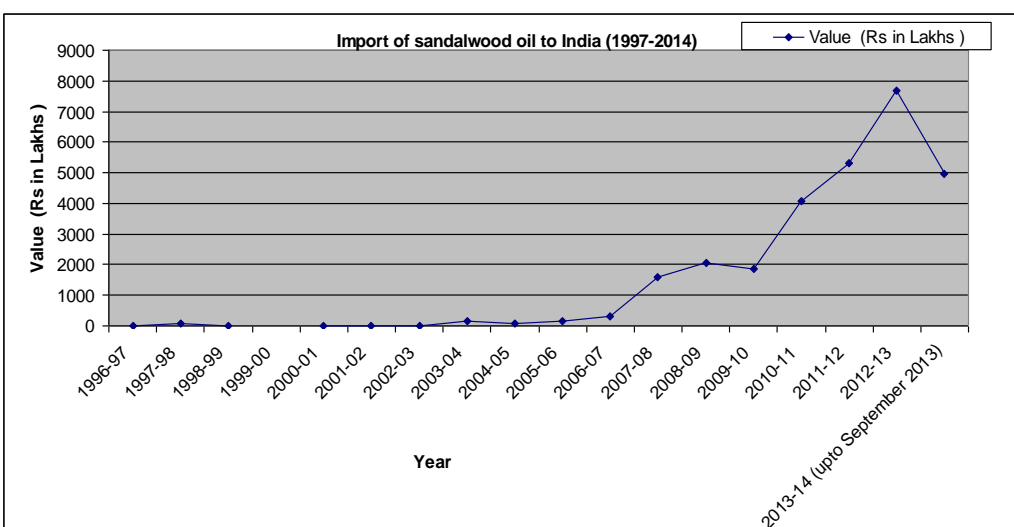
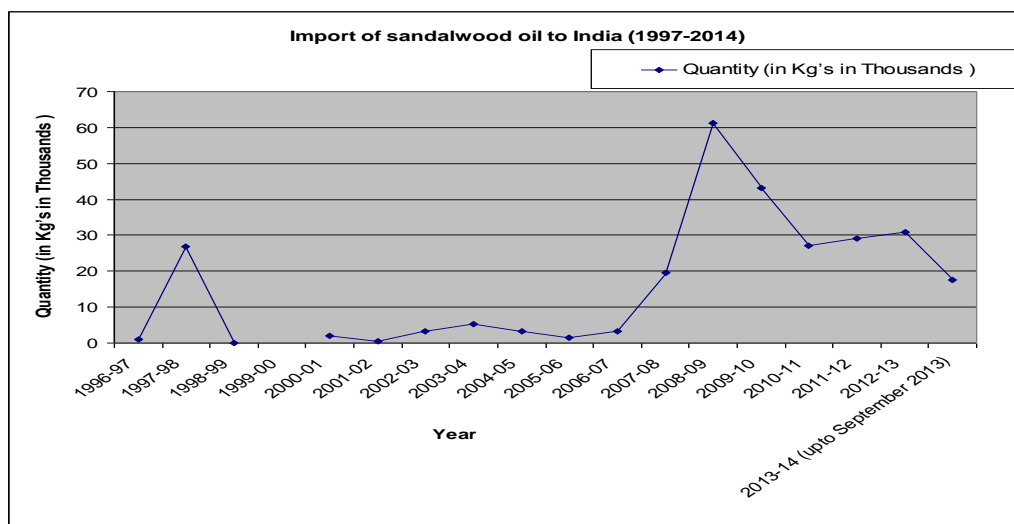
Graph. 3: Export of Sandalwood oil -1924 -1976





Source: Export import data bank version 7.1 Tradestat, Ministry of Commerce & Industry [15].

Graph.4: Export of sandalwood oil (1997-2014)



Source: Export import data bank version 7.1 Tradestat, Ministry of Commerce & Industry [15].

Graph.5: Import of sandalwood oil to India (1997-2014)

### III. CONCLUSION

Sandalwood resource in India especially the wild populations is currently threatened mainly because of illicit felling, forest fire and grazing and to certain extent spike disease coupled with heavy domestic and international demand and with inadequate uniform regulation in the Southern states especially in Tamil Nadu, Karnataka and Kerala. Smuggling of Sandalwood has created socio-economic and law and order problems in all Sandalwood producing states. A uniform law for the entire country on use and transport of Sandalwood may help in the improvement of overall status of Sandalwood wealth in the country. Raising large scale plantations in the natural Sandalwood bearing areas will also add up to the resource building of the valuable tree species. However, the lack of production or domestic consumption data make it impossible to judge the state of the supply base and whether this (and the level of exports) is likely to change in the future. Australian Sandalwood industry is all set to dominate World supply of Sandalwood oil. Highest priorities for *S. album* (East Indian Sandalwood) research has been evincing globally in the field of conservation, understanding plant physiology and genetics to maximize oil production and minimize maturation period, processing, markets mainly focusing to the industrial needs.

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### Abbreviation:

CM-centimeter; GBH- Girth at Breast Height; Ha – Hectare ; Km – Kilometre; Kg – Kilogram; Mt - metric tonne, *S. album* – *Santalum album*

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