

SHOREA ROBUSTA- NRG BASED MULTIPURPOSE TREE

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INTRODUCTION

Natural resin and gum-based major plant products such as a natural resin, gum, rubber, tannin, essential oils, and several other materials initially obtained from plants were classified as minor forest products. It considered as an important and widely used group of non-wood forest products. According to census 2015-16, dammars is mainly tapped from the Sal tree (*Shorea robusta*) and during 2015-16 annual production of dammar batu in India was 80-100 tons. Indonesia, India, China, and Sudan are the major producers of resins (Yogi, 2018). Globally, millions of people depend on the collection of NRGs as a means for their livelihood.

Sal dammar dried exudes also called laldhuna is known as the principal dammars of India. It is obtained from the exudates of *Shorea robusta* (Family: Dipterocarpaceae). Dammar is one of the most important commercial triterpenoid resin that primarily contains dammarolic acid ($C_{54}H_{77}O_3$ (COOH)₂). In India, oil is distilled from dammar resin which used for medicinal purposes. Dammars are mainly used in the manufacture of paper, incense or dhoop, wood varnishes and lacquers, some inferior quality paints, and varnishes for caulking boats.

Sal tree considered as the multipurpose and climax species tree in various zones (Stainton, 1972). Sal tree resin is known as Sal [dammar](#) or Indian dammar, also it is popular as Saldhuna in India. The morphological characteristic of Sal dammar occurs in a nearly opaque, brittle, pale yellow form. It has a faint resinous-balsamic odour. Around 30 Million of rural people and forest dwellers depend on Sal forest for fuelwood, fodder, and timber for their livelihood in Central India (Patnaik, 2009). The detailed descriptions of Sal dammar are described below.

Botanical classification		Local name/ synonyms	
Kingdom	Plantae	Hindi	Sagua, Sakhwa ,Sal, Shal, Borsal
Order	Malvales	English	Sal
Family	Dipterocarpaceae	Sanskrit	Shal
Genus	Shorea	Bengali	Sal,Shal,Sakhu
Species	S. robusta	Tamil	Kungiliyam (Resin)
		Nepali	Agrakh,Sakhua ,Sal,Sakwa

1.1 Botanical description of Shorea robusta

The Sal tree is a hardwood timber tree, up to 30-35 m tall and a trunk diameter of up to 2-2.5 m. The crown is spreading and spherical. bole is clean, straight, and cylindrical, but often bearing epitomic branches; Bark dark brown and thick; Leave simple, shiny, glabrous, about 10 to 25 cm long, and 5 to 15 cm broadly oval, at the base; Flowers are yellowish-white, arranged in large terminal or axillaries recompose panicles; long taproot at a very young age and Fruits are 1-1.5 cm large and ovoid. Sal is [evergreen](#); and [deciduous](#), in drier areas and in dry-season, respectively. Generally shedding of the Sal tree leaves in between February to April and leafing out again in April and May.





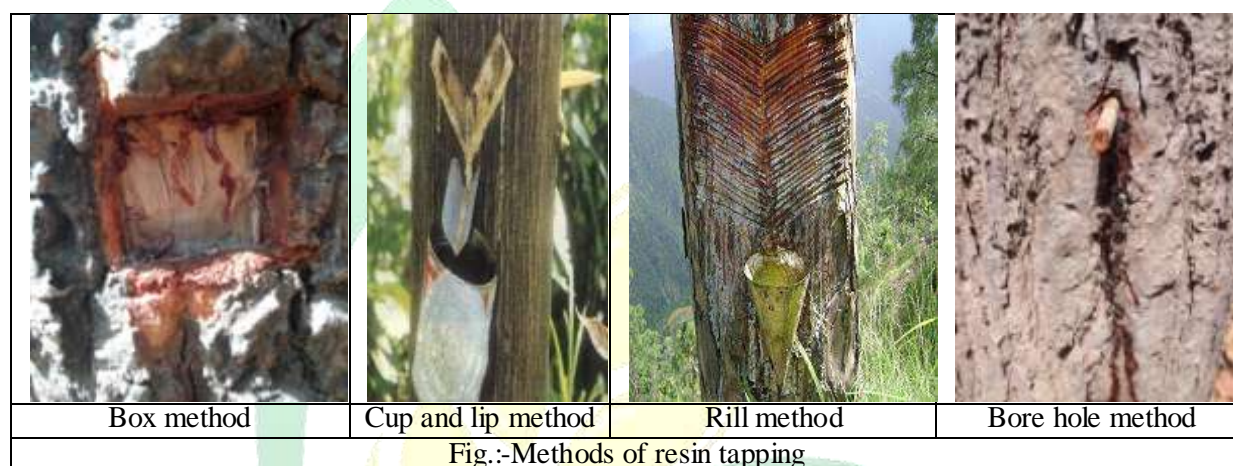
1.1 Distribution of sal forest

Shorea robusta is the state tree of Jharkhand and Chhattisgarh, native to the [Indian subcontinent](#). Sal forests are spread across 10 million hectares in India. Globally, the natural range of Sal forests lies between 20–32°N lat. and 75–95°E long., where the distribution is primarily controlled by climate and edaphic factors (Gautam, 2006). In India, the species is dominantly distributed on the plains and lower foothills of the Himalayas and also along the valleys (Chitale, 2012). In India, the spread of sal forests are found in different states such as Jharkhand, Bihar, Chhattisgarh, Uttarakhand, Andhra Pradesh, Tripura Odisha, Maharashtra, Sikkim, Assam, Meghalaya, Haryana, Himachal Pradesh, Uttar Pradesh, Madhya Pradesh, West Bengal (Champion, 1968).

1.2 The common method in resin tapping

Generally, resin is either collected naturally or by making an incision or set fire at the base of the tree to increase the production of resin for commercial purposes, resin is obtained by tapping standing pine trees i.e. by making an incision or cut on bole, which exposes the surface of the wood. For tapping the trees only a shallow incision is necessary as the flow of resin from the transverse ducts stimulates the secretion of resin in large ones. Factors regulating capacity for resin production are genetic factors, climatic factors, vigor and size, and method and timing of freshening. In India two kinds of tapping are in vogue, viz., (i) light continuous tapping, (ii) heavy tapping. Light continuous tapping is the most common mode of tapping. It is widely practiced in India, and the trees are regularly tapped without any rest.

it is done in trees above 0.9 m in girth. Trees between ranges 0.9 - 1.8 m in girth are tapped in one channel, and for above 1.8 m girth in two channels each at a time (Prasad, 2016). In heavy tapping, maximum possible out turn of the resin is derived and it is achieved by cutting of successive channels (minimum interspace of channels 10 cm between the successive channels) on the bole. In India, broadly four common and highly practiced methods are used for tapping of pine trees such as Box method, Cup and lip method, Rill method and Borehole method (Sharma, 2018)



Cultivation of sal dammar: To obtain the tapping exudates of sal in India, generally tapping involves that removing of 3 to 5 narrow strips of bark; above to the 90-120 cm from the ground, in about 12 days, the grooves become filled with the resin, which oozes out a whitish liquid that becomes brown soon on drying. The cavities of the grooves are freshened, after which the exudation in the cavities continue and the resin is collected as before. The process is repeated several times in a year (Tiwari, 1994). Also, the study was done at Gariaband region to find out the tapping time and effective way for tapping in sal (*Shorea robusta*) and various methods were applied to obtain potential production of exudates. The summertime was found best and combined effect of ethephon and H₂SO₄ were most effective for production of biopolymer. The Collection of resin or dammar from Sal tree can be done several times during the year. Altogether, three lots are obtained, first in June-July, the second in October and the third in January. The resin obtained in June- July is the best in terms of efficient quantity and quality (Anon, 2018-19).

1.1 Importance of Shorea robusta plants

Shorea Robusta trees are the important species known to yield bark tans are commercially utilized and Fruit tans are employed in tanning industries for the extraction of different tannin. A little is used in foods as a clouding or glazing agent. Shorea robusta is an important timber yielding tree and is of great profitable value (**Basyal, 2011**).

The nature of the sal wood is resinous and due to the presence the presence of resin in the wood imparts durability and water resistance to it. The sal resin is also used to caulk boats and ships. It is useful in hyperhidrosis, vitiated conditions of pitta, wounds, ulcers, neuralgia, burns, pruritus, fractures, fever, diarrhoea, dysentery, hemorrhoids, gonorrhoea, menorrhagia, splenomegaly, obesity, cephalalgia, odontalgia, burning of the eyes, and ophthalmodynia (Thombare, 2018).

Sal dammar is widely used as incense especially as an ingredient of Sarnagri which is burnt in religious ceremonies and cremation rites, that emit copious white fumes. The agarbatti industry depends heavily on forest products for raw materials. Sticky powder such as Jigat, **Sal resin**, Guggul (gum / resin of Commiphoramukul), are one of the major components that will be needed for manufacturing agarbatti (**Hazarika, 2018**).

Miscellaneous minor uses include hurdling softer waxes for use in the manufacture of inks, shoe polishes, carbon paper, typewriter ribbon, water-resistant coatings and injection molding materials.

CONCLUSION

The dammar, or resins have a niche market globally, and an extremely important area in this regard is to enhance the global competitiveness through the post-harvest processing and value additions. Resin collection, and transportation activities required a huge amount of forest dwellers or tappers. Therefore, there is a good opportunity of an employment for local poor; revenue generated from the resin is becoming a major source of income. There is also a great opportunity of a sustainable management of the pine forest for multiple benefits, so that, the resin could be extracted for a longer period of a time, and after that, the trees could be felled for other benefits like timber, furniture, and firewood, etc.

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