

What is Frankincense?

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Frankincense is one of Nature's most extraordinary gifts, a resinous exudate from some of the 24 known



species of *Boswellia* trees that range up through Central India, across Oman, Yemen and Soqatra, down through the greater Horn of Africa and across the Sahel to West Africa. These species almost universally occupy harsh, arid environments, where nutrients and moisture are scarce. Some, like *Boswellia sacra* and *B. frereana*, grow directly on limestone rocks, nourished by oceanic mists from the Indian Ocean and Gulf of Aden. Others, like *Boswellia neglecta*, grow abundantly in Vachellia-Senegalia-Commiphora forests spreading through

Somali forests. While some small scale cultivation is taking place, regeneration of most *Boswellia* trees needs specific climatic conditions, making this aromatic and sometimes highly medicinal exudate a rare, revered and sacred gift across the ages.

Boswellia species comes under the family of aromatic and medicinal trees and plants known as Burseraceae, comprising approximately 18 genera, including *Commiphora* (yielding myrrhs, ranging throughout Africa and across to S.E.Asia), *Bursera* and *Protium* found mostly in the Americas, (yielding Copals) and *Canarium* ranging from West Africa across to the Pacific Islands.(yielding Elemi) being some of the best known.

When the outer bark of a Frankincense (*Boswellia*) tree is broken by the wind, animals or people, an immune response releases the often milky white to yellow exudate from resin channels in the inner bark. This exudate hardens as it rests on the tree and is known as Frankincense. It is used by the trees to fend off boring insects and pathogens that attack the trees; the same chemistry that protects the trees from pathogens also confers significant medical benefits to people. For that reason, it has been traded for millennia along ancient trade routes.



While some species such as *B. sacra*, *B. sacra syn. carteri*, *B.serrata*, *B.frereana*, *B.papyrifera* and *B.dalzielii* can be encouraged to release the resin through lengthy and often high risk tapping (making holes with a knife in the tree trunks and branches); the resin of others such as *Boswellia neglecta* is better scraped off from natural exudationsⁱ.

Many of the resins from different *Boswellia* species have been shown to have in vitro and experimental antimicrobial, antiviral, anti-inflammatory, anti-depressant, and other healing activitiesⁱⁱ. The resin of *Boswellia sacra*, *B. sacra syn. carteri*, *B. papyrifera*, *B. serrata*, and *B. dalzielii* have been found to have high quantities of different *boswellic acids*ⁱⁱⁱ, which have been found to have extensive cytotoxic, anti-inflammatory, and other healing capabilities in vitro and in rodent experiments. Aside from testing *B. serrata's* ability to diminish arthritic pain, human clinical trials are yet to be done. In hydro-distillation, the heavy *Boswellic acid* compounds do

not pass over into the essential oils or hydrosols and it is currently uncertain if and how they could be altered by the distillation process in the left over resin.

Of the 24 species listed on the main page, 10 endemic species are found on the Island of Soqotra, and exist in very small populations. As shown in the table below, the resin of about 7 *Boswellia* species is currently commercially exploited out of these 24 known species.

Table 1. The most commonly commercialised species

Species	Range	Main commercial area	Some key constituents of resin
<i>Boswellia serrata</i>	India	Madhya and Andhra Pradesh	a-thujene, serratol, kessane, boswellic acids
<i>Boswellia sacra</i>	Oman and Yemen	Dhofar	a-pinene, limonene, myrcene, incensole, boswellic acids
<i>Boswellia sacra syn. carteri</i> *	Somalia and Somaliland	Gollis Mountains	a-pinene, limonene, myrcene, sabinene, viridiflorol, d-3-carene, incensole, boswellic acids
<i>Boswellia papyrifera</i>	Eritrea across to Chad	North West Ethiopia, Southern Sudan	Octyl acetate, octanol, boswellic acids, incensole acetate
<i>Boswellia frereana</i>	Somalia and Somaliland	Gollis Mountains	a-thujene, a-pinene, sabinene, p-cymene, lupeolic acids
<i>Boswellia rivae</i>	Ethiopia, Somalia, Somaliland, Kenya	Somali region of Ethiopia	a-pinene, limonene, d-3-carene, boswellic acids, lupeolic acids
<i>Boswellia neglecta</i>	Ethiopia, Somalia, Somaliland, Kenya	Southern Ethiopia, Northern Kenya	a-pinene, terpinen-4-ol

**Boswellia sacra* and *Boswellia sacra syn. carteri* are recognised as one species. Because of some differences in the resin and origin *Boswellia syn. 'carteri'* is sometimes described as a distinct product in the industry.

Sustainability starts with ownership, tapping and tree management, practices which differ from region to region. Over tapping a tree because of dire poverty or to meet an unrealistic global demand, can lead to low reproductive capacity, insect infection and high levels of adult tree mortality^{iv}. New tree regeneration is a slow process and is hampered by increased human population density, land use changes, livestock needs and changing social and agricultural traditions. Intentional replanting and stewarded regeneration are still a very new small-scale phenomenon and it is critical to initiate and support these efforts. Nevertheless, at this time, they are still years away from meeting the current demand from a limited number of exploited wild trees.

Many of the sustainability challenges flow from the inequities present in the value chains, in which pervasive poverty, exploitative practices by intermediaries, low prices, and instability tend to incentivize short-term, unsustainable extractive practices. In harvest systems in Somalia and Sudan^v, for instance, harvesters are given loans to pay for food and living costs during the harvest season; when the season finishes, they have to pay back the loan with their frankincense, a procedure that most often leaves them with little profit and in some cases may leave them trapped in a continuous cycle of debt. Figures from 2011 after loan repayments show these structures. 'The average annual net income of tapper, producer, village trader, and urban merchant was estimated to be 74, 740, 1,300, and 11,230 USD, respectively^{vi}. Mostly women earn @US\$1-2/ kilo to sort, sitting long hours on dusty hard concrete floors. The ethics of an extended supply chain rely heavily on the ethics of the intermediaries.

As families grow, towns expand, and other livelihood activities like pastoralism are threatened by climate change-worsened drought, harvesters are under mounting pressure to extract as much resin as possible to

survive. However, informed and conscious engagement by market players has the potential to dramatic change outcomes on the ground. Educated consumers, clear ownership, additional wealth creation, more direct sales and marketing and innovations at the initial community/ harvesting/ sorting levels of the supply chain could create stronger incentives to maintain sustainable harvesting practices and the future of the trees.

ⁱ <https://www.conflictedseeds.com/conflicted-seeds-spirit/frankincense/artists-log/harvesting-frankincense-resin/>

ⁱⁱ Al-Harrasi et al., (2019) 'The Chemistry and bioactivity of Boswellic acids and other terpenoids' Elsevier ISBN 978-0-08-102441-6

ⁱⁱⁱ Al-Harrasi *ibid.*

^{iv} Groenendijk et al. (2012) 'Limitations to sustainable Frankincense production: Blocked regeneration, high adult mortality and declining populations'. *Journal of Applied ecology* 49(1) 164-173

^v Abdalla M.M.A. (2018) 'Economic net return analysis of *Boswellia papyrifera* (Del.) Hochst in the Blue Nile state, Sudan' *Horticultural International Journal* Volume 2 Issue 5

^{vi} Abtew A.A. et al., (2011) *Commodity chain of Frankincense for the dry woodlands of Nuba Mountains, South Kordofan State, Sudan.*

Thanks to Stephen Johnson of FairSource Botanicals for careful editing and fact checking.