CHAPTER-II

PROBLEM TAKEN FOR WORK DONE

Introduction of *Boswellia serrata* (*Family: Burseraceae*) and *Mesua ferrea* (*Family: Clusiaceae*), Types of *Species*, Historical background,

Summarized role in health and disease, Habitat and Distribution, Field Recognition, Features, Botanical Descriptions, Taxonomical Hierarchy,

Names in different Languages.
Chapter-II

Problem Taken and Work Done

II-1 Introduction:

The medicinal plants resource base of a region is usually diverse. It comprises of several species of herbs, shrubs, climbers and trees. These species are found in the forests, grasslands, crop fields, gardens, backyards and other such wild and cultivated habitats of a region. This diverse resource base of a region, is an indicator of the extent to which local communities depend on this resource.\(^5\)

A wide range of plant parts is extracted from these medicinal plants, as raw drugs. These raw drugs are the products of the medicinal plants that possess different medicinal properties. These are derived from different parts from medicinal plant such as stem, flower, fruit, root, exudates and modified plants.\(^7\) While some of these raw drugs are collected in smaller quantities by the local communities and folk healers for local use, many other raw drugs are collected in larger quantities and traded in the market as the raw materials for many herbal industries.\(^{12}\) Therefore, under the present plan, following two plants are taken for their phytochemical investigation.
II -2 *Boswellia serrata* (*Family: Burseraceae*):
The plant family *Burseraceae*, also known as the torchwood family, is a plant family of incense trees. The incenses made from trees of the torchwood family include the widely known aromatics frankincense and myrrh. Even today, members of the *Burseraceae* family are considered as highly valuable for their aromatic properties.

*Burseraceae*, family of flowering plants in the order Spindale’s, composed of about 16 genera of resinous trees and shrubs. The oleo-gum resin from several species of the genus *Boswellia*, called frankincense, was used in biblical times in incense, in medicine, and for embalming. Myrrh is the resin from plants of the genus *Commiphora*. Elemi resins are obtained from other genera of the family, and species such as *Aucoumea klaineana* produce useful timber.  

**Frankincense** is obtained from the genus *Boswellia*, family *Burseraceae* tree. “**Frankincense**”, also called “**Oli-banum**”, is an aromatic resin obtained from trees of the genus *Boswellia*. The term “Oli-banum” is derived from the Arabic *al-lub-n*, means “that which results from milking”. Some have also postulated that the name comes from the Arabic term for “oils of Lebanon” since Lebanon was the place where the resin was sold and traded with Europeans. The word oli- banum may be from the Arabic word
for the resin “Laben” or “Luban” which is a word that also means cream. The trees are found in East Africa (Somali country), South Arabia, and India.

Oli-banum has been traded on the Arabian Peninsula and in North Africa for more than 5000 years. This Oli-banum was found in the tomb of Ancient Egyptian king Tutankhamen, who died in 1323 B.C. (about 3332 years ago). Oli-banum was introduced to Europe by Frankish Crusaders, and it is better known as “Frankincense” to westerners.

*Boswellia* is a genus of trees known for their fragrant resin. Frankincense is an extract from the resin of the tree. There are four main following species of *Boswellia* species, including *Boswellia serrata* in India, *Boswellia carteni* in East Africa and China, *Boswellia frereanam* in Somalia and *Boswellia sacra* in Arabia. Which produce true frankincense and resin is available in various grades. The grades depend on the time of harvesting and it is in hand sorted for quality. In the Indian medical system of Ayurveda, *Boswellia serrata* is known as “Salai Guggal”, As in Sanskrit known as “Gajabakhshya”, it suggests that human observed elephants ingesting this plant i.e., ancient Indian Ayurvedic healers witnessed these huge animals feeding on *Boswellia serrata* (belonging to family Burseraceae) trees,
which grow widely across the dry hills of northwest India. Coupling this observation with their knowledge of elephant’s longevity and astounding physical capacity, early doctors began questioning whether the elephant’s dietary intake of *Boswellia serrata* might offer similar benefits to humans, though in much smaller amounts.

**II-2.1 Types of *Boswellia* Species:**

There are four main following species of *Boswellia* species:-

1. *Boswellia serrata* (Roxburgh), a leafy forest tree of the India.

2. *Boswellia Papyrifera* (Del. Ex Caill.) yields a transparent resin, probably destitute of gum, though thought to contain a volatile oil. It grows in western Abyssinia.

3. *Boswellia frereana* (elemi frankincense), the Yegaar of the Somalis, yields a fragrant resin of a lemon odour, it contains no gum, and is employed in the east as a masticatory.

4. *Boswellia Sacra* (Flueck) is used in incense, perfumes and the resin has many pharmacological uses particularly as anti-inflammatory agent.
II-2.2 Historical background:

“And when they had come into the house, they saw the young Child with Mary, His mother, and fell down and worshiped Him. And when they had opened their treasures, they presented gifts to Him: gold, frankincense, and myrrh”.

–Matthew\textsuperscript{45} 2:11(2) page 150.

“And the Lord said to Moses: “Take sweet spices, state and niche and galbanum, and pure frankincense with these sweet spices, there shall be equal amounts of each. You shall make of this incense, a compound according to the art of the perfumer, salted, pure, and holy.”


Members of the plant family \textit{Burseraceae} have a long history of use. They have been of great cultural significance historically, and many continue to hold them in high esteem today. Old World species of the \textit{Burseraceae} Family include \textit{Commiphora myrrha}, commonly known as myrrh, and \textit{Boswellia sacra}, commonly known as frankincense. The sap or resin of these plants can be harvested to produce aromatic oils.\textsuperscript{57}

The oils manufactured from frankincense and myrrh is highly valued for use in religious rites, and is frequently mentioned in the Judeo-Christian religious texts.
*Commiphora gileadensis*, commonly known as Balm of Gilead, has long been valued for its fragrance, perhaps more so because it is relatively rare. The Greek physician, pharmacologist, and botanist *Pedanius Dioscorides* wrote of the benefits of this plant, as did the Roman physician *Galen*. It's also mentioned in the Christian Bible.

The sap of the *Commiphora africana*, commonly known as bdellium, was once used in ceremonial rites honoring the God Mars. The Roman historian *Pliny* believed that the bdellium tree originated in Bactria. Women of the ancient world were said to carry pouches of the tree's hardened sap, as a form of perfume.

In Sanskrit, “*Gajabhakshya*” suggests that *Boswellia sps.* has been ingested by elephants in Ayurvedic medicine since antiquity. Interest in this plant was aroused due to elephants being capable of carrying their weight over a long period of time, yet still outliving humans. Therefore, the elephants were studied to find out what was in their diet, and *Boswellia sps.* was found to be one ingredient.  

Large amounts of it were needed in Egypt for the daily cult temples and in the funerary rituals. Internally, it served in the treatment of the abdomen, as a purgative, as a stimulus to take food, liver and bladder ailments, for
coughs, poisons, worms, and skin diseases, pain in the arms, and sores. It was known as a skin irritant, which caused better flow of blood; hence it was used to stimulate menstruation.

Externally, it served in the treatment of stiffness, vessels, joints, wounds of different kinds, inflammatory conditions, pain in the legs, demons, pus, stomach problems, pressure in the ear, and to stimulate birth. The oil was used as an ingredient in embalming liquids for mummification.

*Boswellia sps.* is also used to treat various diseases of the eyes, toothaches, tongue problems, prevention of infection of the birth canal, and it was chewed. The smoke is considered helpful for women’s problems, and to eliminate odour in the house, clothing, or body. It is known as a disinfectant, in general. Mixed with pomegranate juice, it found use as an astringent. Aside from pharmaceutical applications, it has a strong placebo effect. The patient believed if it is being offered to the Gods, then it would surely help her/him. Traditionally, the various species are not differentiated medicinally.

*Boswellia sps.* is burned before the statues of the God and the ancient Egyptians burned it at sunrise to honor the Sun God, the burning frankincense was said to enhance spirituality, mental perception, prayer, and
It is said to burning produce a psychoactive substance trans-hydrocannabinol.

Chinese Herbalists used frankincense for moving qi/blood, rheumatism, menstrual pain, and as an external wash for sores and bruises. The oils are also believed to have medicinal properties, and have been used to disinfect wounds, treat lice infestations, and cure gonorrhea.

South American species of the Burseraceae family, such as Bursera simaruba, or the gum bolimbo tree, have also found medicinal uses among native populations. The Mayans are believed to have used the resin of this tree to treat fever, upset stomach, headache, nose bleed, and burns. They may have also relied heavily on the resin for ceremonial incense production.

**II-2.3 Habitat and Distribution:**

The genus *Boswellia* (family Burseraceae) consists of many species widespread throughout the world. It includes approximately 23 species of small trees that grow mainly in India, on eastern coast of Africa and in Arabia.
## Table 4:

**Summarized role of *Boswellia Sps.* in Health and Diseases**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analgesic</td>
<td><em>Decreases motor activity and ptosis in rats</em>. 8,14</td>
</tr>
<tr>
<td>Arthritis</td>
<td><em>Decreases infiltration of leukocytes into knee joint and pleural cavity and inhibits the migration of polymorph nuclear leukocytes</em>. 60</td>
</tr>
<tr>
<td></td>
<td><em>Decreases severity of pain and disability in osteo-arthritis patients</em>. 56</td>
</tr>
<tr>
<td>Asthma</td>
<td>*Increases stimulation of mitogen activated protein kinase MAPK1 and mobilization of intracellular Ca^{2+}.</td>
</tr>
<tr>
<td></td>
<td><em>Effect on bronchial asthma</em>: result of a double –blind, placebo-controlled, 6-week clinical study.</td>
</tr>
<tr>
<td>Autoimmune Encephalitis(AE)</td>
<td>*Inhibited ionophore stimulated release of leukotrienes from PMNL’s.</td>
</tr>
<tr>
<td></td>
<td><em>Decreases symptoms of AE</em>. 53</td>
</tr>
<tr>
<td>Bowel disease</td>
<td><em>Use of complementary and alternative medicine in Germany – a survey of patients with inflammatory bowel disease</em>. 32</td>
</tr>
<tr>
<td>Cancer</td>
<td><em>Inhibition TH1 cytokines and promotes TH2 cytokines in vitro</em>. 13</td>
</tr>
<tr>
<td></td>
<td>*Anti-proliferative and apoptotic effect on colon cancer. Induced anti-edema effect in glioblastoma patients.</td>
</tr>
<tr>
<td></td>
<td><em>Cytostatic and apoptosis -inducing activity of boswellic acids toward malignant cell lines</em> in vitro*. 28</td>
</tr>
<tr>
<td></td>
<td>*Anti-tumor and anti-carcinogenic activities of triterpenoid, beta-boswellic acid.</td>
</tr>
<tr>
<td></td>
<td><em>Boswellic acid acetate induces differentiation and apoptosis in leukemia cell lines</em>. 60</td>
</tr>
<tr>
<td></td>
<td><em>Inhibition of boswellic acids of human leukocytes elastase</em>. 42</td>
</tr>
<tr>
<td></td>
<td>*Inhibitory activity of boswellic acids from <em>Boswellia serrata</em> against human leukemia HL-60 cells in culture.</td>
</tr>
<tr>
<td>Chronic colitis</td>
<td><em>Effects of gum resin of <em>Boswellia serrata</em> in patients with chronic colitis</em>. 24</td>
</tr>
<tr>
<td>Crohn’s disease</td>
<td><em>Decreases activity index</em>. 24</td>
</tr>
<tr>
<td>Hepato-protactive</td>
<td><em>Effect of hexane extract of <em>Boswellia serrata</em> Oleo-Gum-Resin on chemically induced Liver damage</em>. 33</td>
</tr>
<tr>
<td></td>
<td><em>Evaluation of anti-ulcer activity of <em>Boswellia serrata</em> bark extracts using aspirin induced ulcer model in albino rats</em>. 32</td>
</tr>
<tr>
<td>Hypolipidemia</td>
<td>*Decreases cholesterol and increases HDL in rats.</td>
</tr>
</tbody>
</table>
Induced nitric oxide production in rat macrophages.

**Inflammation**

* Decreases galactosamine/endotoxin induced hepatitis in mice.
* Decreases inflammatory features in indomethacin-induced ileitis in rats.
* Decreases experimental murine colitis.
* Inhibits the synthesis of 5-LOX products.\(^8,9,58\)
* Inhibits topoisomerase, elastase and C-3 convertase enzymes.
* Decreases canine inflammatory joint and spinal disease\(^14\).

**Immunomodulatory**

* Immuno-modulatory activity of boswellic acids of *Boswellia serrata* Roxb.\(^53\)
* Anti-anaphylactic and mast cell de-granulation.
* Effect of salai guggal ex-*Boswellia serrata* on cellular and humeral immune responses and leukocytes migration\(^45\).  


**II-2.4 Field Recognition Features:**

- The tree is medium to large sized up to 18 meters in height and up to 2 and a half meters in girth. The stem is easily breakable.

- The bark is greenish grey, yellow or reddish grey in colour and thick, with smooth exfoliating thin papery flakes; it is resinous inside.

- Leaves are clustered at the tip of branch, about a feet long. Leaflets are 10 –15 pairs. The branch lets and leaflets when emit a mango smell crushed.

- White small flowers are arranged in racemes or panicles, twice the size of mango flowers.

- The hard fruits are three angled; they split into 3 valves.
II-2.5 Botanical Descriptions:

A deciduous middle-size tree, bark ash coloured, peeling off in thin flakes; young shoots and leaves pubescent.

Leaves 20-38 cm long; leaflets opposite, (2.5-6.3) x (1.2-3) cm, sessile 8-15 pairs and an odd one (the pair at the base of leaf often much smaller than the others), variable in shape, ovate or ovate-lanceolate, usually inequilaterally and obtuse, crenate-serrate, more or less pubescent, base acute, rounded, or some what truncate.

Flowers in axillary racemes, shorter than the leaves. Petals 5 mm long, ovate, pubescent outside, tips inflexed. Stamens inserted at the base of an annular crenate disk; anthers slightly pubescent.

Ovary surrounded by the disk; Style grooved. Drupe trigonous; Pyrenes heart shaped; Cotylendon trifid.

II-3 Mesua ferrea (Family: Clusiaceae):

The indigenous market of Indian traditional medicine is full of herbal products mainly from Indian medicinal plants. ‘Nagakesar’ is a well known plant in Ayurveda. Various plants of different genus and family are sold under the same common name Nagakesar. In our market survey five
medicinal plants viz. *Mesua ferrea* Linn. (*Clusiaceae*), *Ochrocarpus longifolius* (*Guttiferae*), *Cinnamomum wightii* (*Lauraceae*), *Calophyllum inophylum* Linn. (*Guttiferae*) and *Dillenia pentagyna* Roxb. (*Dilleniaceae*) were found to be sold in the Indian market under the similar common name ‘Nagakesar’.

There is a growing interest in the pharmacological evaluation of various plants used in Indian traditional system of medicine. *Mesua ferrea* belonging to *family Clusiaceae*, commonly called Ceylon ironwood, Indian rose chestnut, Cobra's saffron or Nagkesar.

The plant is named after the heaviness of its timber and cultivated in tropical climates for its form, foliage and fragrant flowers. It is native to tropical *Sri Lanka* but also cultivated in *Assam*, in southern *Nepal*, in *Indochina* and the *Malay Peninsula*.

*Mesua* is a rather large genus consisting of about 48 species of stove evergreen shrubs or trees that are widely distributed in many tropical countries e.g. India, Burma, Thailand, Indochina and New Guinea.
II-3.1 Types of Mesua Species:

1. **Mesua ferrea Linn.** - Family -**Clusiaceae**. This is most accepted source of “Nagkeshara” and considered to be the original source.

2. **Ochrocarpus longifolius**  Benth & Hook -**Family -Guttiferrea**

Dried flower buds are considered as “Ratun Nagakeshara”.

3. **Cinnamomum wightii Meissn.** - Family -**Lauraceae**

Unripe fruits sold in the market as “Karu Nagakeshara” and “Siddha” and Tamilnad Vaidyas use in the name of “nattu nagkeshara/sirungappu”.

4. **Calophyllum inophylum Linn.** -**Family -Guttiferrea**

Stamens are sold as Nagkeshara.

Other species *Calophyllum elatum and Calophyllum apetalum*.

5. **Dillenia pentagyna Roxb.** -**Family -Dilleniaceae**

Unripe fruits are used under the name -Malabar Nagkeshara in Malabar and Chennai. Other species Dillenia *indicia*.
II-3.2 Habitat and Distribution:

The tree is found in the Himalayas from Nepal eastwards, in Northeastern India, Deccan Peninsula and the Andaman Islands, ascending to an altitude of 1,500 meters.

II-3.3 Field Recognition Features:

- A medium-sized to large evergreen tree with a short trunk often buttressed at the base.

- Bark is grayish or reddish brown in colour, exfoliating in large thin flakes.

- Its leaves are lancet shaped, leathery in texture, and are generally covered with a waxy coating underneath; they are red coloured when young.

- White coloured large flowers are seen in singles or in clusters of 2-3; they are fragrant. At the centre of the petals, there are yellow coloured numerous stamens.

- Fruits are egg shaped, nearly woody, 1-2 inches long, with a persistent calyx.

- Seeds are dark brown in colour, measuring up to 1-4, up to an inch in diameters; with fleshy and oily cotyledons.
II-3.4 Distinguishing features:

- Dried stamens form the raw drugs from this tree. They are short and thread-like pieces that measure about half a centimeter and appear as golden brown or copper coloured coarse powder.

- Stamens sometimes carry small bead like anther lobes at the tip.

- Dried flaky petals, if present, are creamish white in colour.

- They emit an agreeable odour.

- The taste is slightly mucilaginous.

II-3.5 Botanical Descriptions:

A middle sized, glabrous tree; trunk straight, erect; bark smooth, ash coloured; young branches twiggy, slender.

Leaves (7.5-12.5) x(2.5-3.8) cm oblong-lanceolate, red when young, afterwards shining above, glaucous and pruinose beneath, rounded or acute at the base and with close, inconspicuous nerves; petioles 6-8 mm long.

Flowers are very fragrant, 2.5-7.5 cm diameter Axillary or terminal, solitary or in pairs, sus-bessile; buds sub-globose; bracts → 0, Sepals → 4,
orbicular, cupped, puberulous outside, persistent, the inner pair much longer than the outer. Petals 4, pure white, spreading, obovate, cuneate, with crisped and undulate margins often torn. Stamens very numerous, golden, yellow, much shorter than the petals, slightly united at the base into a fleshy ring; anthers oblong. Style twice as long as the stamens, stigma peltate.

Fruit 2.5-3 cm long ovoid with a conical point, surrounded by the enlarged sepals; pericarp tough, semi-woody, at the length 2-valved. Seeds 1-4, angular, smooth, and chestnut-brown.

Table 5:

**Summarized role of Mesua Sps. in Health and Diseases**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antioxidant and Hepatoprotective Activities</strong></td>
<td>Ethanolic Extract: An <em>in vitro</em> study of three Indian commercially available Nagakesar(^{20}). Methanolic Extract: An <em>in vitro</em> study of three Indian commercially available Nagakesar(^{21}).</td>
</tr>
<tr>
<td><strong>Anticonvulsant Activity</strong></td>
<td>The ethanolic extract of <em>M. ferrea</em> inhibits Maximum Electroshock Seizure (MES) induced convulsions.</td>
</tr>
<tr>
<td><strong>Anti-Inflammatory</strong></td>
<td>C. Gopalakrishnan, et al, (1980) Studied anti inflammatory and CNS depressant activities of xanthones from <em>Calophyllum inophyllum</em> and <em>Mesua ferrea</em>.</td>
</tr>
<tr>
<td><strong>Anti-Venom</strong></td>
<td>Nunthaun Uawonggul et al, (2006), studied aqueous extracts of 64 plant species were screened for their activity against fibroblast cell lysis after Heterometrous laoticus scorpion venom treatment.</td>
</tr>
<tr>
<td><strong>Cytotoxic Activities</strong></td>
<td>Cytotoxic activities of chemical constituents from <em>Mesua daphnifolia</em>(^{17}).</td>
</tr>
</tbody>
</table>
II-4 Taxonomical Hierarchy of *Boswellia serrata*:

- **Kingdom: Plantae-Plants**

- **Phylum: Angiospermae**

- **Sub-phylum: Dicotyledonous**

- **Division: Spermatophyta**

- **Family: Burseraceae**

- **Tribe: Rosopsida**

- **Sub tribe: Rosidae s. lat.**

- **Order: Rutanae**

- **Class: Anacardiales**

- **Genus: Boswellia**

- **Species: Serrata**
II-4.1 Names in different languages:

- Latin: *Boswellia serrata*
- Sanskrit: shallaki, gajabhakshya
- Arabian: zarw
- Urdu: Kundur
- Punjabi: Salai Gonda
- Marathi: Salai cha dink
- Bengali: luban
- Chinese: ru xiang (*B. carterii*), Fan Hun Hsiang
- English: frankincense, Indian olibaum
- French: baswellie-den telee, arbre à encens
- German: salaibaum
- Hindi: luban, salai guggul (*B. serrata*), sallaki guggul
- Nepalese: gobahr shalla
- Persian: husn-e-lubban
- Sinhalese: kundirikkam
- Tamil: kunthreekan
- Unani: luban
II-5 Taxonomical Hierarchy of *Mesua Ferrea*:

- **Kingdom**: Plantae-Plants
- **Phylum**: Angiospermae
  - **Sub-phylum**: Monocotyledones
  - **Division**: Lignosae
    - **Order**: Guttiferales
      - **Family**: Clusiaceae
        - **Sub-family**: Calophylloideae
          - **Tribe**: Calophylleae
            - **Genus**: Mesua
              - **Species**: ferrea
II-5.1 Names in different languages:

- Sanskrit: Nagkesara
- Bengali: Nagesar, Nagesvara
- Hindi: Naghas, Nogkesar
- Marathi: Nagachampa
- Punjabi: Naga kesar
- Assam: Naboor
- Bihar: Nagkeshur
- Tamil: Irul, Karunangu
- Telugu: Naga kesarālu
- Kannada: Kanchana, Nagasampige
- Malayalam: Nagachempakam, veluttachempakam
- Oriya: Nageshwar

II-5.2 Synonyms:

- Punnaga: It denotes Gender mentioned best qualities among the trees.
- Kesar: Its useful part strikeshara (Stigma)
- Deva Vallabha: It has beautiful, fragment flowers and it is admired by the Gods so called “Deva Vallabha”.
- Naga Pushpa: This flowers fragrance like hastimada, so it is called Nagapushpa.
- Naga Kesara: Its kesara (Stamens) liked by snakes so it is called Nagakeshara.
Table 6:

Taxonomical Hierarchy of *Boswellia serrata* and *Mesua ferrea*

<table>
<thead>
<tr>
<th></th>
<th>Medicinal Plant-1</th>
<th>Medicinal Plant-2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kingdom</strong></td>
<td>Plantae-Plants</td>
<td>Plantae-Plants</td>
</tr>
<tr>
<td><strong>Phylum</strong></td>
<td>Angiospermae</td>
<td>Angiospermae</td>
</tr>
<tr>
<td><strong>Sub-phylum</strong></td>
<td>Dicotyledonous</td>
<td>Monocotyledones</td>
</tr>
<tr>
<td><strong>Division</strong></td>
<td>Spermatophyta</td>
<td>Lignosae</td>
</tr>
<tr>
<td><strong>Order</strong></td>
<td>-----------------</td>
<td>Guttiferales</td>
</tr>
<tr>
<td><strong>Family</strong></td>
<td>Burseraceae</td>
<td>Clusiaceae</td>
</tr>
<tr>
<td><strong>Sub-family</strong></td>
<td>-----------------</td>
<td>Calophylloideae</td>
</tr>
<tr>
<td><strong>Tribe</strong></td>
<td>Rosopsida</td>
<td>Calophyleae</td>
</tr>
<tr>
<td><strong>Subtribe</strong></td>
<td>Rosidae s. lat.</td>
<td>-----------------</td>
</tr>
<tr>
<td><strong>Overclass:</strong></td>
<td>Rutanae</td>
<td>-----------------</td>
</tr>
<tr>
<td><strong>Class:</strong></td>
<td>Anacardiales</td>
<td>-----------------</td>
</tr>
<tr>
<td><strong>Genus</strong></td>
<td>Boswellia</td>
<td>Mesua</td>
</tr>
<tr>
<td><strong>Species</strong></td>
<td>Serrata</td>
<td>Ferrea</td>
</tr>
</tbody>
</table>
Table 7:
Names in different languages

<table>
<thead>
<tr>
<th>Latin</th>
<th><em>Boswellia serrata</em></th>
<th><em>Mesua ferrea</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sanskrit:</td>
<td>Shallaki, Gajabhakshya</td>
<td>Nagkesara</td>
</tr>
<tr>
<td>German:</td>
<td>Salaibaum</td>
<td>Nagassamen.</td>
</tr>
<tr>
<td>French:</td>
<td>Baswellie-den telee, Arbre à encens</td>
<td>Arbre de fer, Bois d’anis,Bois de fer</td>
</tr>
<tr>
<td>Chinese:</td>
<td>Fan Hun Hsiang, Ru xiang (<em>B. carterii</em>)</td>
<td>Tie li mu, (Taiwan)</td>
</tr>
<tr>
<td>Hindi:</td>
<td>Luban, Salai guggul , Sallaki guggul</td>
<td>Naghas, Nogkesar</td>
</tr>
<tr>
<td>Marathi:</td>
<td>Salaphli</td>
<td>Nagachampa</td>
</tr>
<tr>
<td>Gujarati:</td>
<td>Dhup,Gugali,Mukulsalai</td>
<td>Naboor</td>
</tr>
<tr>
<td>Punjabi:</td>
<td>Salhi</td>
<td>Naga kesar</td>
</tr>
<tr>
<td>Bengali:</td>
<td>Luban</td>
<td>Nagesar,Nagesvara</td>
</tr>
<tr>
<td>Tamil:</td>
<td>Kunthreekan</td>
<td>Irul, Karunangu</td>
</tr>
<tr>
<td>Telugu:</td>
<td>Anduga,Dhupamu,Guggilamu, Parangisambrani</td>
<td>Naga kesaralu</td>
</tr>
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<td>Malayalam:</td>
<td>Hladini,Stayyanti,Mukundam, Palankam,Parankisamprani</td>
<td>Nagachempakam, veluttachempakam</td>
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<td>Oriya:</td>
<td>Loban</td>
<td>Nageshwar</td>
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<td>Persian:</td>
<td>Husn-e-lubban</td>
<td>Narmishka</td>
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