

## CHAMPAKA – AN AROMATIC BOON

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### ABSTRACT

*Chamapaka* is one of the important drug from Pushpa varga of Bhavaprakasha nighantu, known as Atigandha. *M. champaca* belonging to family Magnoliaceae is an evergreen tree mainly cultivated in Indian gardens and near temples for its fragrant flowers and handsome foliage. Its highly distributed in eastern Sub-Himalayan tract, West Bengal, Myanmar and South India in addition to China. It is noted for perfumery and envisaged as 'Joy perfume tree'. 'Joy' the second bestselling perfume in the world is derived in part from the essential oil of champaca flowers. Champaka finds its utility in ethnomedicine like bark is diuretic, febrifuge and flowers, fruits are anti-spasmodic, stomachic and also in commercial industries. Flowers are the source of Champa oil, used in perfumery, in preparation of attars and perfumed hair oils. Current review article encompasses different views in Ayurveda literature and botanical description, cultivation, powder microscopy and extraction method.

**KEYWORDS:** *Chamapaka, Cultivation, Extraction, Economical importance, Aroma therapy*

### INTRODUCTION

Magnoliaceae family consists of nearly 250 species, including many handsome, fragrant-flowering trees and shrubs. One among them is *Magnolia champaca* Linn., known as champak in English. It is a large evergreen tree in this family. The tree is native to Southeast Asia-Indochina<sup>1</sup>. It is found in Tropical and Sub-tropical moist broad leaf forest ecoregions. Though there are few references pertaining to Champaka available from Samhitas, in later period Nighantukaras have dealt in detail. Champaka is instilled with properties like Vataraktahara, kushtaghna, krimighna etc., Champa attar is on high demand in market due to its enticing aroma.

Hence it is widely used in making of exclusive and exotic perfumes. The champa attar is extensively used in aroma therapy to treat patients. Its aril-covered seeds are highly attractive to birds. Wood is used for posts, boards, veneers, furniture, decorative fittings and ship-building. It is also suitable for bent- wood ribs, general joinery work, bobbins, drums, battery separators and tea chest plywood. Hence the present article is an attempt to throw light on the economical importance of champaka along with its habit, cultivation, extraction methods etc.,

**Scientific name:** *Magnolia champaca* Linn.  
Syn. (*Michelia champaca*) Linn.

**Family:** Magnoliaceae

**AYURVEDIC PERSPECTIVE:**

**Synonyms of Champaka<sup>2-8</sup>:**- Champeya, Hemapushpa, Kanchana, Swarnapushpa, Hemahva, Peetapushpa, Sthirapushpa, Deepa pushpa, Surabhi, Subhaga, Kusumendra, Ramya, Kumarivallabha, Sukumara, Varalabdha, Bringamohi, Bhramara, Vanadeepa, Sheetala, Sheetachhada, Sthiragandha, Atigandha.

**GANA/VARGA<sup>2-7, 10-13</sup>**

Dhanwantari nighantu	Aamradi varga
Kaiyadeva nighantu	Oshadhi varga
Bhavaprakasha nighantu	Pushpa varga
Raja nighantu	Karaveeradi varga
Madanapala nighantu	Karpuradi varga
Nighantu shesha	Vriksha kanda
Shodala nighantu	Vishaya sangraha
Rajavallabha nighantu	Rajanibhava parichheda
Abhidana manjari	Sankeerna varga
Abhidana ratnamala	Katu skanda

**VARIETIES<sup>5</sup>:**

Two types are explained by Raja nighantukara

1. Rajachampaka
2. Kshudra (vana) champaka

**KARMA<sup>2-5</sup>:** Dahanashana, Kandughna, Krimighna, Kushtaghna, Vranahara, Chakshushya, Hridya, Sugandhi

**ROGAGHNATA<sup>3-5,9</sup>:** Kusta, Mutrakrichra, Vatarakta, Raktapittahara

**PART USED<sup>14</sup>:** Flower

**POSOLOGY<sup>14</sup>:** Powder 1-3gm

**FORMULATIONS OF CHAMPAKA<sup>15-18</sup>:**

Ekadashashatika prasarini taila, Baladhatryadi taila, Chandanabalalakshadi taila, Eladi taila, Mahasugandhi lakshmvilasa taila

**Michelia(Magnolia)champaca:**

**ETYMOLOGY<sup>19,21</sup>**

The word Michelia has been given in tribute of the florentine botanist Pietro Antonio Micheli. Champaca word is derived from Sanskrit word ‘Champaka’.

**TAXONOMICAL CLASSIFICATION<sup>20</sup>:**

Kingdom	Plantae
Division	Tracheophyta
Class	Magnoliopsida
order	Magnoliales
family	Magnoliaceae
genre	Magnolia L.
species	<i>M. champaca</i> (L.) Baill. ex Pierre

**VERNACULAR NAMES<sup>21</sup>:**

English - Golden champa  
 Hindi - Champa  
 Kannada - Sampige  
 Tamil - Sampangi  
 Telugu - Chattusampangi  
 Marati - Sonachanpha  
 Gujarathi - Sachochampo  
 Bengali - Champa  
 Konkani - Pudchampo

**BOTANICAL DESCRIPTION:**

Habit<sup>22</sup>: It is a tree growing upto 30 m height, with grey bark, lenticellate. Stem aerial, erect, woody.

Leaves simple, alternate, spiral. lamina 9.5-25cm by 3.5-9cm, elliptic-lanceolate, apex acuminate, base acute to attenuate, margin slightly undulate, glabrous, strongly and reticulately nerved. Petiole 1-3cm long and stout. Flower Solitary, axillary, large, yellow to orange, bracteate with short pedicel, complete, actinomorphic and very fragrant. Perianth usually 15-20 tepals, in whorls of 3 each; either all the 3 whorls petaloid or sometimes outermost tepals become sepaloid. Fruit is etaerio of follicle, warty, 2-3 cm long, arranged as spike, dehiscing dorsally.

Seed single, scarlet and endospermic.

Botanical sources of Champaka<sup>23</sup>:

1. *Michelia champaca* L.
2. *Michelia nilagirica* Zenk
3. *Michelia Montana* BL.
4. *Michelia doltsopa* Buch.- Ham. EX DC

#### **PHARMACOGNOSY<sup>14</sup>:**

##### **Macroscopic characters**

Consists of broken pieces of pedicel, sepal, petal, anthers, gynophore (torus), flowers solitary, fragrant, crumbled, blackish-brown in colour; sepal brown, linear, acute; petal dark brown, oblong; stamens numerous; anther linear, adnate, introrse; gynophore, 2.5-4 cm long; curved style with beak-shaped simple stigma.

##### **Microscopic characters**

**Powder** - Dark-brown; shows fragments of parenchymatous cells, broken unicellular trichomes, vessels with spiral thickening, a few prismatic and cluster crystals of calcium oxalate; a few irregular shaped, elongated, lignified, stone cells with narrow lumen in singles or groups; fairly large circular to spherical, brown coloured, numerous smooth pollen grains measuring 67-82  $\mu$  in dia. having clear exine and intine and a few oil globules.

#### **CHEMICAL CONSTITUENTS<sup>24-26</sup>**

**Root and Stem bark** have lirioidenine, Magnosprengerine, salicifoline

**Root bark** yields sesquiterpine lactones, costunolide, parthenolide, dihydroparthenolide and micheliolide.

**Leaves** contain polysorprenoid,  $\beta$ -sitosterol and lirioidenine.

**Flower** - Essential oil contains  $\beta$ -elemene, borneol, caryophylline,  $\alpha$ -humulene, spathulenol and quercetin.

**Seed oil** - Myristic, palmitic,

hexadecadienoic, stearic, oleic, arachidic, eicosenoic and hexadecanoic acid.

#### **CULTIVATION & PROPAGATION<sup>24</sup>:**

The tree thrives best in damp and requires deep moist soil. It is a moderate light demander and is sensitive to frost. Natural regeneration is usually plentiful around mother trees. Artificial reproduction is accompanied by sowing fresh seeds in the nursery and transplanting 12-15 months old seedlings. Seeds are pretreated with Gibberlic acid for better germination and sown at 1.5 cm depth in the nursery beds, germination commences after 38 days and completes within 70 days. Root and shoot cuttings may also be used. Stump planting has been successful in some places.

#### **EXTRACTION METHOD:**

Champa oil can be obtained from subcritical CO<sub>2</sub> and methanol, hydro-distillation, solvent extraction. Comparative studies on different extractions of champaka have concluded subcritical CO<sub>2</sub> as the optimum process among the three processes for obtaining champa oil with high quality. The essential oil yield on extraction with subcritical CO<sub>2</sub> and methanol are 70% and 80% respectively. In CO<sub>2</sub> extraction  $\beta$ -elemene content extracted is 19.8% at temperature 200-220 C and 60-65 bar pressure which is more than other extraction methods. The chemical composition of the champaka oil obtained by different methods were determined by GC and GC/MS and subcritical CO<sub>2</sub> is optimum process among the three process and compared to methanol process.<sup>27</sup>

**Subcritical Fluid Extraction:** CO<sub>2</sub> is used both in supercritical and subcritical fluid extraction because its solvency power can

change by simply adjusting the temperature and pressure during the extraction. If the temperature is drops below 88F, the CO<sub>2</sub> changes to a liquid and is referred to as subcritical. When the pressure and temperature of the CO<sub>2</sub> are above 1083psi and 88F, the CO<sub>2</sub> is considered supercritical.<sup>28</sup>

Subcritical CO<sub>2</sub> produces much lesser yields than supercritical, but they retain the essential oils, terpenes and other sensitive chemicals within the plant.

#### **Procedure:**

Subcritical fluid extraction is similar to supercritical extraction except for the temperature which is below the critical point in subcritical extraction. The system contains a pump for the CO<sub>2</sub>, a pressure cell to contain the sample, a means of maintaining pressure in the system and a collecting vessel. The liquid CO<sub>2</sub> is pumped to a heating zone, where it is heated to desired conditions. It then passes into the extraction vessel, where it rapidly diffuses into the solid matrix and dissolves the material to be extracted. The dissolved material is swept from the extraction cell into a separator at lower pressure, and the extracted material settles out. The CO<sub>2</sub> can then be cooled, re-compressed and recycled, or discharged to atmosphere.<sup>29</sup>

#### **PHARMACOLOGICAL ACTIVITY BASED ON RESEARCHES:**

Administration of *Michelia Champaca* flowers ethanolic extract produced significant nephron protective activity in cisplatin induced nephrotoxicity model as evident by decrease in elevated serum creatinine, urea, BUN, uric acid and total

protein levels and further confirmed by histopathological study.<sup>30</sup>

Ethanolic, Aqueous and petroleum ether extracts of flower buds of *Michelia champaca* Linn. Were tested for Anti-diabetic activity. Treatment of diabetic rats with Ethanolic extract of the plant restored the elevated biochemical parameters significantly. The crude Aqueous and Petroleum ether extracts were found active only at the end of the first hour.<sup>31</sup>

Work was done to test Procognitive effects of Hexane Extracts of *Michelia champaca* Leaves in Normal and Memory Deficit Mice. The higher dose of *Michelia champaca* extract exhibited more promising nootropic potential, which closely approximated the results of the standard drug Brahmi.<sup>32</sup>

Research work done on the Flower Concrete of *Michelia champaca* L. for finding New Volatile Constituents. GC/MS analysis of the 2 commercial concretes, one absolute and a lab-prepared revealed the presence of more than 240 components. Some quantitative differences were found to exist between the components identified. In the commercial absolute and concretes, the main constituents were phenylacetonitrile (1.2–4.5%), phenylethyl alcohol (25–34%),  $\alpha$ - +  $\beta$ -ionone (1.0–5.0%), methyl anthranilate (2.1–9.0%), indole (2.9–12.0%) and methyl linoleate (10.0–18.0%). In contrast, the lab-prepared concrete contained linalool (11.0%), cis-linalool oxide (pyranoid, 7.0%), dihydro- $\beta$ -ionone (10.0%) and  $\alpha$ +  $\beta$ -ionone (26.8%).<sup>33</sup>

Methanolic extract of flower buds of *michelia champaca* linn. were also evaluated for analgesic, anti-inflammatory and

antipyretic activity. The results showed that the methanolic extract significantly reduced the edema induced by carrageenan within 1 to 5 hrs. On the analgesic property acetic acid induced writhing was significantly reduced in the formalin test. The extract also significantly decreased the painful stimulus in both phases of test which were also appreciable. It significantly reduced fever at higher doses within 2 hrs.<sup>34</sup>

#### **TRADE AND COMMERCE<sup>23</sup>:**

>Champaka flowers are employed in India in the preparation of attars and perfumed hair oils. Attar is extensively used in aroma therapy to treat the patients who are mentally exhausted. It gives soothing and calming effects on mind as well as body.

>Champa Attar is combined with sandalwood oil and used for various skin treatments. It makes the skin glowing as well flawless.

>The wood is used for posts, boards, furniture, decorative fittings, carving, carriages and ship building. It is also used for bent-wood ribs, general joinery work, bobbins, drums, toys and beads.

>Wood is suitable for making pencils, aircraft construction, battery separators and tea chest plywood.

#### **DISCUSSION AND CONCLUSION**

Champaka is well known for its fragrant flowers widely used in perfumery industry and has got medicinal value, culinary use and also timber value. This review contains detailed description of Champaka along with its therapeutic and commercial uses. The synonyms like Hemapushpa, Kanchana are based on the colour. Surabhi, ramya depict the beauty of flowers and Atigandha signifies the fragrance. It is bestowed with

medicinal properties like Kustaghna (skin disorders), Mutrakrichrahara (dysuria) and Vataraktahara (gout). Essential oil obtained from flowers also has gained much importance in Aroma therapy used in various ailments. Due to high demand in perfumery industry, it may be adulterated. The presence of unicellular trichomes, oil globules and pollen grains with distinct intine and exine etc., observed in powder microscopy reveal the quality of Champaka. Since Champaka is rich in volatile principles, to obtain the maximum yield with active constituents in the extract, Subcritical fluid Extraction is the method to be adopted.

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### IMAGES OF *MAGNOLIA CHAMPACA* LINN.



**Champaka tree**



**Bark having lenticels**



**Leaf ventral view**



**Leaf dorsal view**



**Stipule scar**



**Flower**