

Current Understanding of Saussurea Obvallata: A Multidimensional Review

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Abstract: *Background :* Saussurea obvallata (Brahma Kamal) is a rare, endangered, night-blooming flower with notable ethnobotanical, medicinal, and cultural significance. This review summarizes research on its traditional uses, pharmacognostic traits, phytochemistry, pharmacological potential, and conservation strategies. The study highlights the need for urgent conservation efforts to preserve this unique Himalayan species.

Method : This systematic review examines Saussurea obvallata (Brahma Kamal) using databases like PubMed, Scopus, and Google Scholar, Taylor & Francis along with secondary sources such as Shodhganga, JSTOR, publish boo and the Ayush Research Portal. The study explores the botanical, medicinal, and ecological importance of this sacred Himalayan plant.

Results : S. obvallata is widely used in traditional medicine for ailments such as wounds, paralysis, cerebral ischemia cardiac disorders, and mental health issues. It exhibits pharmacological potential, including anticancer, anti-hypoxia, antioxidant, and antimicrobial activities. Various parts of the plant have been used to address conditions like dysentery, rheumatism, leprosy, bone fractures, nerve debilities, and sexual disorders.

Conclusion : S. obvallata demonstrates considerable pharmacological potential and holds significant ethnomedicinal value. While current research highlights its various beneficial properties. Advanced research will be crucial for validating its traditional uses and fully exploring its therapeutic potential in modern pharmacology..

Keywords: Brahma Kamal, Saussurea obvallata, Himalaya, anti inflammatory, anti-microbial ,anti-oxidant, Anti-cancer. Traditional claims

I. INTRODUCTION

Brahma Kamal (Saussurea obvallata DC.), the state flower of Uttarakhand, is an endemic herb native to the Himalayan region, including the Indian Himalayan Region, northern Burma, and southwest China.

Brahma Kamal, a species of flowering plant named after Brahma: he Hindu god of creation is considered the 'king of Himalayan flowers.



Fig: Flower of Saussurea obvallata

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There are various historical milestones that enlighten the existence of *Saussurea obvallata* in the Ramayana and Mahabharata. The most prominent flowering species of Uttarkhand is *Saussurea obvallata* (DC). The genus *Saussurea* (Asteraceae) comprises around 490 species of flowering plants, predominantly found in temperate, cool, and arctic regions of Europe, Asia, and North America. Several species are widely utilized in traditional medicinal systems across countries like India, Nepal, China, Tibet, and Pakistan. Notable examples include *Saussurea bracteata* Decne, used for boils, headaches, and respiratory infections; *S. costus* (Falc.) Lipsch., employed for dysentery, rheumatism, and skin disorders.

This herb holds significant importance in traditional Indian and global medicinal systems, being valued for its affordability, efficacy, and minimal side effects. The growing preference for "natural" medicines highlights these attributes, with the World Health Organization (WHO) reporting that 80% of people in developing countries rely on traditional and folk medicine. The global market for herbal medicines, valued at approximately \$62 billion, is projected to rise to \$5 trillion by 2050, driven by increasing demand in Asia and worldwide. In India alone, the annual demand for herbal drugs is estimated at \$1 billion.

This paper presents a comprehensive review of *S. obvallata*, consolidating the latest research on its ethno medicinal uses, pharmacognostic characteristics, phytochemical composition, pharmacological properties, reproductive biology, and micro propagation techniques. Additionally, it provides an overview on its potential in medicinal and therapeutic applications.

Pharmacognosy :



Fig : flower of *Saussurea obvallata*

Table 1 : Taxonomical classification

Kingdom	Plantae
Sub kingdom	Viridiaeplantae
Phylum	Tracheophyte
Class	Magnoliopsida
Order	Asterales
Family	Asteraceae
Tribe	Cynareae
Genus	<i>Saussurea</i> DC
Species	<i>Saussurea Obvallata</i>
Binomial Name	<i>Saussurea Obvallata</i> (DC) Edgew
Synonyms	<i>Aplotaxis Obvallata</i> DC <i>Theodorea Obvallata</i> (DC) kuntze

LOCAL NAMES:

India:	Hindi: Brahma Kamal Sanskrit: Kaurav Padma, Sairandhri Pushpa Kumaoni (Uttarakhand): Kapfu
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2. Tibetan:	Gyaltzen Metog (meaning "flower of the gods")
3. Chinese:	雪莲花 (Xuě lián huā), meaning "Snow Lotus"
4. Nepal:	Brahma Kamal
5. Bhutan:	Tshering Meto

GEOGRAPHICAL DESCRIPTION AND HABITAT:

Saussurea obvallata, is a perennial herbaceous plant that grows in the mountainous regions of the Indian subcontinent, particularly in the Himalayan range.

Geographical Description:

- **Regions:** It is primarily found in India, Nepal, Bhutan, and Tibet, thriving in high-altitude environments.
- **Altitude:** The plant grows at altitudes between 3,000 to 4,500 meters above sea level.
- **Climate:** It flourishes in cool and temperate climates, typically in areas where temperatures can range from 2°C to 10°C during the colder months.

Habitat:

- **Soil:** It prefers well-drained, rocky, and alpine soils, typically found on steep mountain slopes.
- **Vegetation Type:** The plant typically grows in alpine meadows, rocky areas, and sometimes near mountain streams.
- **Elevation:** Saussurea obvallata is typically found at higher elevations, where the air is thin and the environment is harsh, making it a species adapted to cold and challenging conditions. This unique and sacred plant is known for its striking, large, white to pinkish flowers and is considered a symbol of purity and spiritual significance in Hinduism. The Trans-Himalayan zone, including Ladakh and Lahaul-Spiti, is India's cold desert, known for its extreme climate and unique topography.

This high-altitude region (3,000 to 5,700 meters) supports specialized plants like Saussurea obvallata (Brahma Kamal) and Snow Lotus, thriving in alpine meadows, rocky slopes, and lakesides. These plants are found across India, Nepal, Bhutan, Tibet, and Myanmar. The Kedamath Wildlife Sanctuary, recognized as a biodiversity hotspot by the IUCN, hosts over 425 medicinal plant species, including Podophyllum hexandrum and Aconitum heterophyllum. These plants are crucial for their ecological, medicinal, and cultural significance in the region.

Religious aspect :

Saussurea obvallata, commonly known as Brahma Kamal, holds significant religious, cultural, and medicinal value, particularly in Hinduism and Buddhism. In Hindu mythology, it is a sacred flower dedicated to Lord Brahma, symbolizing purity, spiritual enlightenment, and a connection to the celestial realm. The rare blooming of Brahma Kamal is considered an auspicious event, believed to bring good fortune and divine blessings. In Buddhism, the flower represents purity and the pursuit of spiritual awakening, aligning with the journey toward higher consciousness. Additionally, while its medicinal properties are primarily utilized in Ayurveda, the plant's revered status is enhanced by its role in traditional healing practices. Brahma Kamal, therefore, occupies an important place in both religious practices and cultural traditions, intertwining spirituality and healing.

Morphological Features :

Parts	Colour	Odour	Taste	Shape
Rhizomes	Dark Brown	Odourless	Bitter, Astringent	Tapering Covered with leaf remnants
Stem	Brown	Odourless	Astringent	Stout, Erect
Leaf	Green	Fragrant	Bitter, Astringent	Obovate, Oblong
Flower	Whitish Purple	Fragrant	Sweet, Astringent	Dense umbel like cluster

- **Stem:** Solitary, erect, purplish to reddish-brown, 15-60 cm long, 2-8.33 mm in diameter, ribbed, hollow. The stem has flagellate, uniseriate, eglandular hairs of 0.5-2 mm in length.
- **Leaves:** Basal and lower petiolate, oblong to blunt lanceolate in shape.
- **Leaf dimensions:** 18.7-42.75 mm in width and 8.99-20.83 cm in length.
- **Surface:** Pilose, glandular hairy, glabrescent.
- **Leaf base:** Attenuate, with toothed margins and a distinct mid-rib.
- **Upper leaves (bracts):** 10-12, spirally arranged in pseudo-whorls, creamy white or pale yellow, totally enclosing the inflorescence.
- **Inflorescence:** Length: 15-21 cm; diameter: 70-84 mm.
- **Florets:** Hermaphrodite with an unpleasant smell.
- **Corolla:** Actinomorphic, tubular (11-13 mm), with linear-lanceolate lobes, bluish purple or violet.
- **Stamen:** 6-7 mm, filaments 2-3 mm, anther tube 4-6 mm, appendages 1-2 mm.
- **Achenes:** Dark brown to black, cylindrical or obovoid, smooth, measuring 4-4.8×1.6 mm, distinctly ribbed with 5-7 rounded ribs in cross-section.
- **Flowering and Fruiting Period:** Flowering occurs from July to September, while fruiting takes place from August to October.

PHYTOCHEMISTRY:

Medicinal plants, especially those from the Himalayan region, produce a large variety of secondary metabolites due to cold stress from extreme weather conditions, enhancing their therapeutic value. Phytochemical studies of *Saussurea obvallata* have identified the presence of saponins, phenols, tannins, terpenoids, flavonoids, glycosides, proteins, and alkaloids in its leaf and flower extracts. Additionally, the plant produces essential oils with aromatic and antimicrobial properties and small amounts of alkaloids with possible therapeutic benefits. These constituents underpin its traditional use in treating wounds, inflammation, and as an adaptogen in Ayurvedic medicine.

Saussurea obvallata (Brahma Kamal), a medicinal herb from the Asteraceae family, is rich in bioactive compounds with therapeutic potential. The plant is rich in a diverse array of phytochemicals, including flavonoids such as quercetin and kaempferol, which contribute to its antioxidant and anti-inflammatory properties. Alkaloids present in the plant exhibit analgesic and antimicrobial effects, while phenolic compounds and lignans enhance its strong antioxidant and anticancer potential. Terpenoids, including sesquiterpene lactones, play a significant role in its anti-inflammatory, antimicrobial, and cytotoxic activities. The presence of coumarins adds anticoagulant and antimicrobial benefits, whereas steroids and saponins contribute to immunomodulatory and adaptogenic properties. *Saussurea obvallata* also contains essential oils rich in terpenoids and sesquiterpenes, which have been shown to exhibit antifungal and antibacterial effects. Additionally, tannins and glycosides present in the plant provide astringent, antimicrobial, cardiotoxic, and diuretic activities.

Traditionally, the plant has been used in Ayurveda and local medicinal practices to treat conditions such as fever, inflammation, infections, and wounds, making it a valuable ethnobotanical resource. Its unique phytochemistry and bioactive compounds position it as a promising candidate for further pharmacological research.

Pharmacology :

Components	Biological Activity
Benzeneacetaldehyde	Anti-microbial, anti-inflammatory.
Pregnanolone	Anti-anxiety, anti-inflammatory, anti-microbial.
Nerolidol	Anti-tumor, sedative, analgesic
Pyranone	Anti-microbial, anti-inflammatory, anti-oxidant, anti-proliferative.
Tetradecanoic acid	Anti-fungal, anti-oxidant, cancer-preventive, cosmetic
Gama-Stearolactone	Anti-microbial, anti-inflammatory, anti-nociceptive.
Stigmasterol	Thyroid inhibitory, hypoglycemic effects.
α -Terpineol	Contractile activity, anti-bacterial; anti-microbial; Insecticidal.

Cinnamaldehyde	Anti-cancer, anti-oxidant
Curumene	Anti-tumor, anti-bacterial, anti-inflammatory, sedative, fungicide.
Phytol	Anti-microbial, anti-inflammatory, anti-nociceptive.
Palmitic acid	Anti-androgenic, hemolytic, cancer preventive,
Methyl linoleate	Anti-microbialanti-bacterial, anti-inflammatory, sedative, fungicide
Linoleic acid	Anti-microbial, anti-inflammatory
Piperine	Anti-oxidant, cancer preservative .
Litsomentol	Anti-inflammatory, Anti-microbial.

Saussurea obvallata exhibits a range of pharmacological properties, including anti-inflammatory, antioxidant, antimicrobial, hepatoprotective, and immune modulatory effects. Its bioactive compounds, such as flavonoids, alkaloids, and phenolic acids, make it effective in treating inflammatory disorders, oxidative stress, infections, and liver conditions. Its anti-inflammatory properties help in reducing swelling and pain, while its antioxidant activity protects cells from oxidative damage caused by free radicals. The plant also exhibits antimicrobial and antifungal actions, making it useful against infections.

The hepatoprotective effects of Saussurea obvallata protect the liver from toxins and oxidative injury, supporting liver health. Its immunomodulatory activity enhances the body's immune response, and its wound healing properties promote tissue repair due to its antiseptic and astringent nature. Additionally, the plant has adaptogenic properties, aiding in stress resistance and improving physical and mental endurance.

Traditionally, it has been used for treating fever, respiratory conditions like cough and cold, digestive issues, and promoting overall health. While its pharmacological potential is well-documented in traditional medicine, further scientific studies and clinical trials are required to confirm its efficacy and safety in modern medical applications.

Medicinal Uses :

Here are some potential medicinal health benefits of Saussurea obvallata along with relatable examples:

- 1. Anti-Inflammatory Properties :** Saussurea obvallata inhibits the activity of Cyclooxygenase (COX) enzymes (COX-1 and COX-2), reducing the synthesis of prostaglandins and Lipoxigenase (LOX), which lowers leukotriene production. These effects reduce pain and inflammation in conditions like arthritis and soft tissue injuries. Saussurea obvallata is believed to possess anti-inflammatory properties, which could be beneficial in reducing inflammation and associated symptoms. The plant's root or extracts might be used in conditions like arthritis, joint pain, and inflammation-related discomfort.
- 2. Digestive Support :** The plant's root is often used in traditional medicine to aid digestion and relieve digestive issues. An herbal remedy made from Saussurea obvallata might be prescribed to individuals experiencing indigestion, bloating, or abdominal discomfort.
- 3. Respiratory Health :** The plant's extracts might be used in remedies for managing conditions like coughs, colds, and bronchitis.
- 4. Anti-spasmodic Effects :** Saussurea obvallata might have muscle-relaxing properties, making it useful for alleviating muscle spasms and related discomfort. In traditional medicine, the plant's preparations could be used to relieve menstrual cramps or muscle tension.
- 5. Immune System Support :** Some traditional uses of Saussurea obvallata suggest that it could have immunomodulatory effects, helping to support the immune system. The plant formulas aimed at enhancing the body's natural defense mechanisms.
- 6. Antioxidant Activity :** Saussurea obvallata contain compounds with antioxidant properties that help protect cells from oxidative stress and damage.
- 7. Wound Healing :** The plant is believed to possess wound-healing properties that could aid in the recovery of minor cuts and abrasions. In traditional medicine, a poultice made from Saussurea obvallata might be applied topically to promote the healing of small wounds.

8. **Stress Reduction:** *Saussurea obvallata* might have adaptogenic qualities, helping the body cope with stress and promoting a sense of well-being. Traditional formulations containing the plant might be recommended to individuals dealing with stress, anxiety, or fatigue.

9. **Anticancer:** The plant part like leaves and flower possess anticancer activity. Used in treatment of breast cancer

It's important to note that while *Saussurea obvallata* has been traditionally used for these purposes, scientific research validating these health benefits is limited. As with any herbal remedy, it's advisable to consult with a qualified healthcare professional before using *Saussurea obvallata* for medicinal purposes, especially if you have existing health conditions or are taking other medications.

Various formulations of saussurea obvallata :

The formulations of *Saussurea obvallata* typically depend on its intended application, preparation method, and traditional usage. Below are some common formulations and uses:

1. **Raw Herb Form** - Dried Leaves and Flowers: Used as a tea or decoction for respiratory and gastrointestinal issues. Powdered Form: Prepared by grinding dried parts of the plant, often mixed with honey or warm water.
2. **Decoctions and Infusions** : Water Decoction: Made by boiling the dried plant in water to extract its active compounds. Used for pain relief and inflammation. Herbal Infusions: The flowers and leaves are steeped in hot water for mild ailments like colds or as a general health tonic.
3. **Oil Infusions** : Infused in carrier oils like sesame or coconut oil to create medicated oils for external application on wounds or sore muscles.
4. **Tablets or Capsules** : Some manufacturers encapsulate the powdered herb as tablets or capsules for easy oral consumption, targeting immunity and overall wellness.
5. **Tinctures and Extracts** : Alcohol-based tinctures or hydro-alcoholic extracts are made for higher potency. These are used in small doses for anti-inflammatory and antimicrobial effects.
6. **Ayurvedic Formulations** : Used in Ayurvedic preparations, often combined with other herbs, for conditions like fever, ulcers, and skin diseases.
7. **Balms and Creams** : Incorporated into topical ointments or creams for wound healing, inflammation, or as a skin rejuvenator.
8. **Traditional Tibetan Medicine** : Used in formulations known as "Amchi medicine" for promoting longevity and treating chronic conditions.
9. **Syrups or Tonics** : Formulated as herbal syrups combined with other plant extracts for respiratory ailments or general vitality.
10. **Incense or Spiritual Use** : Dried flowers are sometimes used in incense or religious rituals, believed to purify the environment and enhance spiritual practices.

II. DISCUSSION

On discussing the above information, it may be concluded that *S. obvallata* is a plant of considerable spiritual and clinical significance, with a long history of use in traditional medicine for a wide range of ailments. According to a literature review, various parts of the plant have been employed to treat conditions such as dysentery, rheumatism, leprosy, bone fractures, nervous debilities, cerebral palsy, paralysis, sexual disorders, lung infections, urinary tract infections, leukoderma, rhinitis, and hyperthermia. Overall, *S. obvallata* stands out for its diverse therapeutic properties, and the growing body of scientific evidence supports its traditional use in treating various health conditions. Further research is needed to explore its full potential and clinical applications

III. CONCLUSION

Present paper provides a comprehensive review of the traditional uses, pharmacognosy, phytochemistry, pharmacology, reproductive biology, micropropagation of *Saussurea obvallata*. *Saussurea obvallata* is a remarkable plant with ecological, medicinal, and cultural importance. While its traditional uses and symbolic value have been celebrated for centuries, modern science provides an opportunity to harness its potential sustainably. However, addressing the challenges of conservation and over exploitation is critical to preserving this unique species for future generations.

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