



Saussurea costus : A TREASURE IN TRADITIONAL AND MODERN MEDICINE

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Introduction

In India, the ancient system of Ayurvedic medicine, with a history spanning over 5,000 years, gives considerable importance to the utilization of medicinal plants. The Ayurvedic scriptures, notably the Charaka Samhita and Sushruta Samhita, offer in-depth knowledge about the healing attributes of numerous plants, including *Saussurea costus*. This is why the 'Plantae' kingdom is referred to as the "Treasure House of Potential Drugs."

Phytochemicals categorize a globally recognized plant under medicinal and aromatic herb known as *Saussurea costus* (Falc.) Lipsch., synonym *Saussurea lappa* C.B. Clarke. The initial botanical name was ascribed by Ainsley, who undertook the task of identifying "koostum," also known as "koot" in Sanskrit. It belongs to the Asteraceae family of dicotyledons, which has 11,000 genera and around 23,000 species, is the second-largest family of flowering plants. There are 61 species of *Saussurea* DC. in India out of the approximately 300 species.

Order: Asterales

Family: Asteraceae/ Compositae

Genus: *Saussurea* DC.

Species: *Saussurea costus* (Falc.) Lipsch (syn., *Saussurea lappa*)

Chromosome no.: $2n = 26$ & $2n = 36$

Trade name: Kuth, Kut, Uplet

Common name: Costus, Saw-wort and Snow lotus, Kuth, Qust

Status: Critically endangered according to IUCN, *Saussurea costus* is one of 29 medicinal and aromatic plants that the Indian government has banned from being exported, whether in their raw form or as processed products. In order to regulate the trade of *S. costus*, the Jammu and Kashmir region has also implemented a special Act, The Kuth Act, 1978.

- Part used: Roots (strong, pungent and sweet aroma with bitter taste).
- Potency: Neutral
- Adulteration: *Inula racemosa* is a *S. costus* adulterant.



Geographical Distribution

Southern-Asia and China are considered as the native place of the *S. costus* plant and it is widely distributed in the wild across India, particularly at altitudes ranging from 2500 to 3000 masl (meter above sea level) but can also be cultivated at 1800 masl among the regions of Western Himalayas;

Jammu & Kashmir (Kishenganga and Chenab valley), Himachal Pradesh (Chamba), Sikkim, Arunachal Pradesh, Uttarakhand (Pithoragarh, Bageshwar, Chamoli, Tehri, Uttarkashi) and Kashmir. Cultivation of *S. costus* is important to suit the market demand, especially due to over-exploitation of the wild plant. This helps in sustainable harvesting and conservation of the species.

Phytochemistry of *Saussurea costus*

The major secondary metabolites of *Costus* plant are; Terpenes (Costunolide, Cynaropicrin) make up the majority of its active ingredients, although it also has flavonoids, alkaloids (Saussurine), ketone (Dehydrocostus lactone, Lappadilactone), alcohols (Elemol, γ -costol, Vulgarol) saponins, tannins, reducing sugars, cardiac glycosides and others (Saussureal, Saussuramines). The presence of Chlorogenic acid was initially reported by (Pandey et al., 2004) which has antioxidant principle is also present in *S. costus* and clarified it by HPLC.

Pharmacological uses of *Kuth*:

Anti-cancer

The anticancer potential of a phytoconstituent (costunolide) extracted from *S. costus* roots was examined in cancer cells (HL-60) of human. Reactive oxygen species (ROS) evaluations, mitochondrial membrane potential evaluation and apoptosis analysis were used to prove costunolide's potential as an anticancer drug. In human cancer cell lines (DU145), the chemopreventive efficacy of *S. costus* extract (hexane) was investigated. Isolated from extract, dehydrocostus lactone exhibited potent anticancer properties and stopped cancer cells from multiplying by triggering apoptosis.

Prostate Cancer: Hexane extracts from the roots of *S. lappa* were able to induce apoptosis in human prostate cells who were unresponsive to androgen. It ceases the prostate cancer cells' movement.

Oral cancer: In human oral cancer, the dried roots of *S. lappa* showed combating malignant cells dividing. Western blotting and the DNA fragmentation test were employed to conduct the research.

Breast cancer: An inhibitory impact was shown on the metastasis of breast cancer cells by Costunolide, which was derived from *S. costus* extract. When the tests were conducted on mice and after few days of observation a considerable reduction of breast cancer cell growth and metastasis were obtained.

Hypoglycaemic

When a comprehensive survey and clinical study on powerful hypoglycaemic plants of various Indian regions was conducted to find anti-diabetic plants used in Indian traditional medicines and by different tribes, *Saussurea costus* was found to be the most effective for obese diabetes.

Antimicrobial

The ethanol extract of *Saussurea costus* was shown to significantly inhibit the synthesis of water-insoluble glucan at concentrations of 2–4 mg/ml in a glucan synthesis assay. Furthermore, the inhibitory effects of the ethanol extract on *Streptococcus mutans* were examined, revealing its ability to reduce bacterial growth, acid production and adherence.

Anti-depressant

Additionally, some studies indicate that women who inhale *Costus* sorrel oil during labor see a reduction in pain-related

symptoms. The medication eases trepidation, anxiety and associated symptoms. It has also been observed that its effect on the mother or the foetus is very negligible or no negative effects.

Usable forms of Kuth

Kuth is employed in a variety of forms, with its roots being the most utilized part due to their rich concentration of active components beneficial for treating various ailments and illnesses. The roots are commonly employed in the following ways:

Powder: The roots are often dried and ground into powders, making them convenient for consumption or application in medicinal preparations.

Decoction: Extracts from the roots are prepared by boiling or simmering them in water. These decoctions are then used for therapeutic purposes.

Raw form: In some cases, the roots are used in their raw, unprocessed state, either by chewing or incorporating them into traditional remedies.

Root oil: Additionally, root oil can also be extracted from Kuth roots, providing another valuable form for medicinal use.

These diverse forms of utilization highlight the versatility of Kuth as a valuable resource in traditional medicine.

General uses

- Kuth had various historical applications, including its use for preventing moths and other pests from damaging Kashmiri woollen items like shawls and carpets, essentially serving as an insecticide and fumigator.

Traditional formulations:

Consumption forms/ formulations	Ailments	References
Root powder decoction	Indigestion, cough and cold, fever, bronchitis	(N. C. Shah <i>et al.</i> , 1971)
Root powder + warm milk	Recover weakness and fatigueness	(Bapalal, 1998)
Dried roots are chewed	Throat pain, cough	(Pandey <i>et al.</i> , 2007)
Root powder heated in ghee and topical application on affected part	Rashes & itching skin, rheumatism	(Nautiyal <i>et al.</i> , 2001)
Root powder + any oil heated and massage on head	Relieves headache	(B. Singh <i>et al.</i> , 2019)
Root powder decoction + jaggery	Oliguria (less urination)	
Root powder + honey	Epilepsy	
Root oil	Scabies & fungal infections	
Costus root powder + <i>Acorus calamus</i> root powder	Haemorrhoids (piles)	

- In earlier times, the roots were also utilized as a substitute for opium and were smoked in different regions of India and China. Moreover, In China, Kuth was employed as a remedy for toothaches. Its aroma is not only used for fragrance but also finds application in aromatherapy for its potential therapeutic effects on various ailments and conditions like mental stress, depression, anxiety etc.
- Dried root pieces are commonly smoked in a hookah to alleviate stress and fatigue,

offering a traditional method for relaxation and rejuvenation.

- Root-extracted Kuth oil is used to make high-end fragrances as well as hair care products like hair wash and hair oil. Mustard oil heated with Kuth root powder helps in gaining hair volume and removing dandruff.

Side effects

Kuth is typically safe when consumed in moderate amounts, but taking it in excessive quantities can lead to several adverse effects. Overuse may increase acidity, leading to symptoms such as abdominal pain, cramping, frequent gas and sour belching. It can also cause heartburn, nausea and in severe cases, vomiting. To minimize the risk of these side effects, it is important to consume Kuth within recommended dose.

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