

PHARMACOGNOSTIC STUDY OF STRYCHNOS POTATORUM LINN - A REVIEW

Dr. Janhavi R. Alwe¹ Dr. Rajesh S. Alwe²

Asst. Professor, Dept. of Dravyaguna Vigyan, Smt. K.G.M.P. Ayurveda College & Hospital,
Charni road Mumbai -400002

Ayurved Practioner, Shri, Rameshwar Clinic, Vikroli (East), Mumbai-55

ABSTRACT

Strychnos potatorum, family Loganiaceae, is also known as Clearing Nut tree is deciduous tree which has height up to 40 ft. The family consist of 35 genera and 550 species. Plants are distributed in tropical regions and frequent in warm regions. The seeds of the tree are commonly used in traditional medicine as well as for purifying water. Also it is used in Ayurveda, unani, sidha and folk medicine for treating several ailments including microbial infections, diarrhoea and diabetes. Katak (*strychnos potatorum*) is one of those drug which is given in treatment of *Prameha*(Diabetes) but not widely used by *vaidyas*. *Nighantu ratnakar*, *kaiyadeo nighantu*, *Shaligram nighantu* have mentioned use of this single dravya for *Prameha*. The medicinal effects are well documented in many publications. The present article is aimed to provide a broad overview of pharmacognosy, phytochemistry of Katak (*strychnos potatorum*) Phytochemical studies revealed the presence of diaboline, and its acetate, brucine, loganin, mannose, sucrose, arachidonic, lignoceric, linoleic oleic, palmitic and stearic acids. Seeds of *strychnos potatorum* have revealed the presence of alkaloids, flavonoids, glycosides, lignins, phenols, saponins, steroids, tannins.

Keywords: Pharmacognosy, Ayurvedic properties, *strychnos potatorum*

INTRODUCTION

Our ancient life sciences *Ayurveda* ,is not a system of medicine but a dynamic philosophy of life by which one can attain healthy individual and social life so as to perform the functions efficiently and fulfil the social obligations fully at the end to attain perfect bliss of liberation. Medicinal plants played an important role in Indian culture since *Rigveda* (5600Bc). Herbal tablets, herbal tonics, herbal soaps, shampoos talcum powder have become popular consumers items .The very word *herbal* has become the symbol of safety for these products in contrast with *synthetic* .Once which has become highly unsafe for human consumption. Herbal medicines and food

supplement industry has seen quite phenomenal growth in the recent years. India has a wealth of flora with hundreds of the plants possessing medicinal or curative properties. Herbs are staging a comeback and an herbal Renaissance is blooming across the world. Despite this wealth, India has a small share in medicinal plants trade in the world market. This dismal condition is attributable to several factors including non-identification of bioactive molecules, lack of uniformity in cultivation, processing, storage, transport, extraction and formulation processes.

PLANT PROFILE^{1,2} *Strychnos potatorum* is a medium-sized, glabrous tree of height 12-13 m. belonging to Bengal, Central and plentiful in

southern India. Seeds contain no strychnine but Brucine is present. Seeds are alternative tonic, stomachic and demulcent. They are non poisonous. Seeds are used to clarify foul and muddy water.

CLASSICAL NAMES³: *Katak, Ambuprasad, Tiktaphala, Gudaphala, Toyaprasadana phala, Chakshushya, Dantaphala, Dantapushpa, Tiktamaricha,*

VERNACULAR NAMES^{1,4}

English –Clearing nut tree, Hindi – *Nelmal, Nirmali*, Marathi – *Chilbing, Gajara, Niramali, Chilhara*

Gujarati – *Nirmali*, Punjabi –*Nirmali*, Bengali-*Nimali*, Kannada-*Cilu, Cilledabjia*. Malayalam – *Katakam, Tetta, Tettamparel*, Tamil – *Akkolam, Ilalam, Tetla*

SCIENTIFIC CLASSIFICATION

Kingdom: Plantae, Division: Spermatophyta, Class: Dicotyledonae, Subclass: Gamopetalae, Order: Gentanaceae, Family: Loganiaceae, Genus: *Strychnos*, Species: *Potatorum*

BOTANICAL DESCRIPTION^{5,6,7} Tree - *Strychnos potatorum* is a medium-sized, glabrous tree of height 12-13 m. Stem is fluted and covered with black, thick, square to rectangular scales

Bark- Bark is 1.32 cm thick, black or brownish-black, corky, with very deep and narrow vertical, thin ridges, which easily break off. Branches are swollen at nodes.

Leaves- Leaves are about 57.5 cm long, nearly sessile, subcoriaceous, ovate or elliptic, acute, glabrous and shining, spuriously three or five nerved, with lateral nerves springing from the lower part of the mid rib, nearly reaching the tip. The base rounded or acute, petioles 2.5 mm long. Flowers- flowers large for the genus, in short almost glabrous nearly sessile axillary cymes; peduncles 0.5 mm long; and pedicels very short. Calyx-2 mm long, five lobed; lobes 2.5 mm long, oblong, acute with a tuft of hair inside towards the base of each lobe. Ovary ovoid, glabrous, tapering into a long glabrous style; and stigma obscurely two lobed. Fruits- Fruit is a berry, black when ripe, globose, 12 cm in diameter, whitish, shining, with short addressed yellow silky hairs.

Seeds- Seeds are globose in shape

Flowering occurs in September-October, while fruiting occurs in December

DISTRIBUTION⁸ : It occurs in deciduous forest of Bengal ,central and south india upto 1200 m .

PARTS USED⁸: Seed.

PROPAGATION & CULTIVATION^{8,9}

Propogation: Time of propagation-Monsoon, It can easily be propagated by seeds, Population of *katak* is depleting fast due to self non generative mechanism in fruits.They are often decayed and are prone to fungal attack as soon as they fall.

Climate condition:

Altitude -1000m-1200m, Rainfall -1100 mm-2500mm, Climate- Hot climate, Sun light –Full Sun, Soil type-Black Soil

TRADITIONAL USES^{1,10,11}

Any Ayurvedic drug can be used in two form, first one is single drug another one is in yoga form i.e. in combination with other drugs.

According to *Ayurveda* seeds are used in various diseases like *Prameha, Netravikar, Mutravaha strotas vicar*(urinary problems) . Roots cure leukeoderma whereas fruits are useful in eye diseases, thirst, poisoning, and hallucinations. The fruits are emetic, diaphoretic, etc., According to Unani system of medicine, seeds are bitter, astringent to bowels, aphrodisiac, tonic, diuretic and good for liver, kidney complaints, gonorrhoea, colic, etc.

- Powdered stem bark mixed with lime juice given in cholera
- Leaves: As poultice over maggot infected ulcers
- Seed: Tonic stomachic demulcent emetic and used in acute diarrhea, diabetes, gonorrhoea, and eye diseases like conjunctivitis, lachrymation, or copious watery of eyes. The paste of seed is reported to be consumed internally along with little tender coconut milk in urinary disorder and retention of urine.
- The seeds of *kataka* is rubbed with honey and mixed with little camphor is applied as collyrium to eyes .It clears eyes.
- *Arjuna* (Eye disease)-In this disease, *Kataka* ,rocksalt and honey or *rasanjana*

mixed with honey or *kasisa* with honey should be used in collyrium.

- One should take ghee cooked with *gokshura* decoction along with eight times milk. In the similar way, it should be processed with the drugs of *sthiradi* or *katakadi* groups separately.
- *Kataka* seeds 10 gm. is pounded with buttermilk and taken with honey. It alleviates all types of *Prameha*.

AYURVEDIC PROPERTIES^{1, 4,10 11}

CLASSICAL CATEGORIZATION: *Charak-Vishghna, Sushruta-Parushakadi, Vagbhata-Parushakadi*

RASAPANCHAK

Rasa : Madhur, kashay, *Guna* : Guru (heavy) , *Ruksha* (dryness), *Veerya* : Sheeta, *Vipaka* : Madhur (sweet), *Doshaghata* : *Kapha* – *vata* (subsidies *kapha* – *vaata*)

According to API

Rasa- Madhura, **Tikta,** **Kashaya,** **Guna-** Guru, **shita,** **Virya-** Ushna, **Vipaka-** Katu, **Prabhava-** Chakshushya¹²

ROGAGHANATA (Therapeutic uses)

Mutrakricha , *Mutrashmari*, *krimi*, *Aruchi*, *Trishna*, *Shula*, *Netraroga*, *shukrameha*, *Rakta AbhiĀyanda*, *Prameha*, *visha*, *Apasmar*

IMPORTANT FORMULATIONS -

Dashamularishta , *Niruryadi gutika*

DOSAGE ¹² Seed powder -1 to 2 gms *Vamak matra* – 6 gms

PHARMACOGNOSY ^{1,13}

MACROSCOPY OF SEED

Foreign matter	Not more than 2 %
Total Ash	Not more than 2 %
Acid-insoluble ash	Not more than 0.5%
Alcohol-soluble extractive	Not less than 1 %
Water-soluble extractive	Not less than 5 % .

PRELIMINARY PHYTOCHEMICAL SCREENING ¹⁴

Extraction of *strychnos potatorum* seeds using ethanol by cold maceration method; this test solution was subjected to various chemical to detect the presence of secondary metabolites

Phytochemical screening	EESP
Phenols	+
Flavonoids	+
Alkaloids	+
Coumarin	-
Glycosides	+

The seeds are button shaped and contained in a black pulpy fruit about size of a cherry. Diameter-1.6 cm/2-3 inches, Width-1.25cm/1-4 inches, Circumferentially sharp raised edge is present at some point on edge its interrupted where radical is attached, from this point a faint line passes up to the umbilicus.

Covering of seed is yellowish brown in colour and covered by minute silky hair. It is dicotyledonous in nature

MICROSCOPY OF SEED

Microscopy of seed shows testa, consisting of 2 or 3 layers, thick-walled, elongated, lignified sclerenchymatous cells covered with numerous, cylindrical, unicellular, lignified, trichomes having basal portion ramified; outer endosperm composed of 3 to 8 layers of thick-walled, elongated palisade-like cells arranged in rows, an inner endosperm composed of thin-walled, oval to polygonal, parenchymatous cells having numerous small aleurone grains and oil globules. (In seed of *Strychnos nux-vomica* base of trichome is pitted, bulbous, ramified with a projection normally elongated and thick-walled).

Powder Study - Creamish-yellow and oily; shows fragments of testa, trichomes, endosperm cells and oil globules.

PHYSICOCHEMICAL ANALYSIS ¹

Tannins	+
Fixed oil&fats	-
Lignins	+
Steroids	+
Proteins &Free amino acid	-
Gums &Mucilage	-
Saponins	+

TLC¹: T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate : Diethylamine (70:20: 10). On spraying with Dragendorff reagent with tartaric acid two spots appear at Rf. 0.38 (orange and corresponding to that of Brucine) and at Rf. 0.55 (faint orange and corresponding to that of Strychnine).

PHYTOCHEMISTRY¹⁵ Phytochemical studies revealed the presence of diaboline, and its acetate, brucine, loganin, mannose, sucrose, arachidonic, lignoceric, linoleic oleic, palmitic and stearic acids. Seeds of *strychnos potatorum* have revealed the presence of alkaloids, flavonoids, glycosides, lignins, phenols, saponins, steroids, tannins.

CONCLUSION:

The *Strychnos potatorum* plant is native plant of Indian subcontinent. It is traditional drug which is discussed by about all *Nighantu*. Preparations of *Katak* are written by all other *granthas* like *Bhaishyaja Ratnavali*, *Sharangdhar*, *Vangasena* etc. but More preparations are given in *sahasrayoga* as it is more used in South India. But overall there is very less literature available about *Katak*. It is very useful in *Netravikar*, *Mutravikar*, *Prameha*. The pharmacological activities reported in this is present review confirm that the therapeutic value of *Strychnos potatorum* is very high having a leading capacity for the development of a new, safe, effective and cheaper drug in future, but more pharmacological investigations, clinical trials and public awareness for the best utilization of its medicinal properties is required. Hence, pharmaceutical companies should also come forward with new concepts and methods towards the best use of this potential medicinal plant.

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Fig.: 1] Seed of *Strychnos potatorum* (Katak)

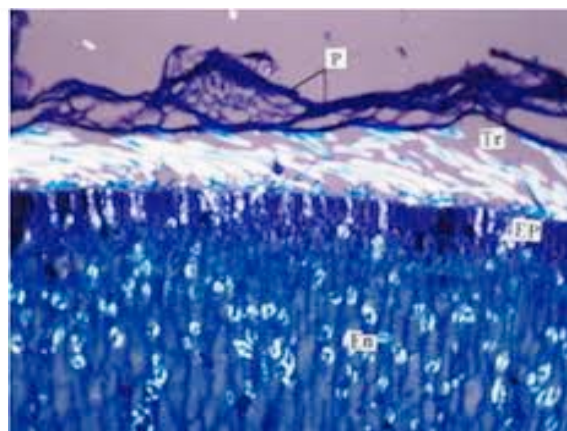


Fig. : 2] T.S. of Katak seed

CORRESPONDING AUTHOR

Dr. Janhavi R. Alwe

Department Of Dravyaguna Vigyan,
Smt. K.G.M.P. Ayurveda Mahaviyalaya,
Mumbai, Maharashtra, India.

Email: janhavalwe.ja@gmail.com

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