



MEDICINAL PLANT REVIEW: *Katuki (Picrorhiza kurroa Royle ex. Benth)*

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ABSTRACT

Throughout human history, plants have played a significant role in medical treatments, and traditional medicine continues to be widely practiced today [1]. Countries like India and China have a strong emphasis on their traditional systems of medicine, and their respective governments take necessary measures to support these practices. The World Health Organization estimates that traditional medicine serves as the primary healthcare for approximately 80% of the global population. One of the main reasons for this is the low cost of herbal medicines compared to modern pharmaceuticals, as they can be grown from seeds or sourced from nature at minimal or no expense. In Ayurvedic medicine, *Katuki (Picrorhiza kurroa Royle ex Benth)* is a highly popular hepatoprotective drug. It is primarily used for treating hepatic disorders but also known for its anti-inflammatory, anti-microbial, anti-diabetic, immunomodulatory, anti-asthmatic, and weight management properties. The plant's bioactive compounds, such as iridoids, cucurbitacin, and acetophenones, are considered to be the most important. This review aims to provide a comprehensive overview of the herb, including information from various *Samhitas* (ancient Ayurvedic texts) and its study in modern areas.

KEYWORDS: *Katuki*; *Picrorhiza kurroa*; Habitat; Morphology

INTRODUCTION

Katuki, also known as *Picrorhiza*, is a well-known herb that exhibits hepatoprotective properties and a wide range of pharmacological activities. It is effective in removing excessive fire energy from the body, making it a cooling agent. By balancing pitta and *Kapha*, it aids in preventing acidity, digestive issues, and fat accumulation. Furthermore, *Katuki* improves digestion and facilitates the metabolism of carbohydrates, proteins, and fats. Enhanced metabolism assists in managing various conditions such as elevated levels of urea, creatinine, diabetes, heat, and hyperthyroidism. It is worth noting that this medicinal herb has been used for therapeutic purposes for over 5000 years.

HABITAT

The stems and the conical buds along with the drugs usually form a part of the drug itself¹. The rhizome of this perennial herb is long, externally grayish-brown, surface rough due to longitudinal wrinkles & Taste is bitter². Rhizomes are jointed and zigzag, cylindrical, irregularly curved with branching and rooting at the jointed nodes³. The roots are invariably wrinkled in the longitudinal fashion having transverse cracks. They are grayish to brown in appearance, while the fracture is tough¹. Root stacks are irregularly curved as thick as the little finger^{4,5}. Leaves are basal and alternate with terminal spikes present in this species. They are of 5-10 cm in length^{2,5}. 9-10 mm long, 4-lobed, and bilabiate; stamens slightly di-dynamous almost equaling corolla². Stem is small, weak, creeping, erect at flowering, leafy, and slightly hairy³

REVIEW OF LITERATURE

Katuki is known in *Ayurveda* as '*Katuka*'. In several *Nighantus* and *Samhitas*, the synonym and the properties of *Katuka* are mentioned. In '*Vedas*' there is no written description is given. Following is an overview of some representative sources in which *Katuka* is described. From various *Ayurvedic* literatures starting from *Samhitas* to *Nighantus* we get the various description of the plant *Katuki*. Even we can find the scattered references in the classics like *Charaka Samhita*⁶, *Sushruta Samhita*⁷, *Astang Samgraha*⁸, *Dhavantari Nighantu*⁹. In *Dhavantari Nighantu* various synonyms of *Katuka* is mentioned like *Matsyaskala*, *Katuka*, *Tikta*, *Chakrangi*, *Asokarohini*, *Tiktakarohini*, *Arista*, *Janani*. Here also the properties of *Katuka* is been mentioned like *Tikta*, *Katu*, *Pittajit*. *Katuka* conquers cold, blood and burning sensation, destroys *Kapha* and overcomes digestion of food and removes remittent fever (*Visamajvaranasini*). List of formulation mentioned in *Sarangadhara Samhita*¹⁰ where *Katuki* is one of the main ingredient.

**NIGHANTU**

BHAVAPRAKASHA NIGHANTU: Different synonyms like *Katvi*, *Tikta*, *Asoka*, *Katuka*, *Katambhara*, *Rohini* and *Katurohini* are mentioned. *Rasa* of *Katuka* is *Tikta*. *Guna* is *Rukshma*, *Sheet*, *Laghu*. *Vipak* of *Katuka* is *Katu* and it works as *Agnidipak* and the other indications of *Katuka* are *Pittajwar*, *Prameha*, *Swash*, *Sasa*, *Rakta Dosh*, *Daha*, *Kustha*, *Kriminasak*¹¹.

RAJ NIGHANTU: *Ras* of *Katuki* is *Katu*; *Veerya* is *Sheeta* and well known for the disease like *Jwar*, *Swasa*, *Kaphaja Vikara*, *Rajyakshma*, *Ruchya Bardhak*¹²

NIGHANTU ADARSA: In this text we found the drug is called as '*Katuki*' or '*Kutki*', also the synonyms and '*Nirukti*' for the plants are mentioned. With this distribution, description and *Upayog* of the drug is also mentioned. Most importantly the main part of use is also described as root (*Mool*) and also it has been confirmed that though it is supposed that *Gentiana kurroo* (*Trayaman*) and *Picrorhiza kurroa* are same but they are different from each other¹³.

SYNONYMS¹⁴ -:

- *Katuka*, *Tikta*, *Katurohini*
- *Matsyashakla*
- *Chakrangi*, *Krishna*, *Shat parva*
- *Kaandrooha*

VERNACULAR NAME¹⁵ -:

Language	Name
Sanskrit	Katuka, Tikta, Katurohini,
Hindi	Katuka
Bengali	Kattki
Punjabi	Kaundd
Marathi	Bal kadu, kali katuki
Gujrati	Kadu
Telugu	katukarohini
Tamil	Katukarogini

AYURVEDIC PROPERTIES¹⁴ -:

Rasa	<i>Tikta</i>
Guna	<i>Ruksha</i> , <i>Laghu</i>
Virya	<i>Sheeta</i>
Vipaka	<i>Katu</i>
Karma	<i>Kapha-pittahara</i>

GHANA

CHARAKA: *Bhedaniya*, *Lekheniya*, *Stanyashodhana*, *Tikta skandhas*¹⁶

SUSHRUTA: *Patolyadi*, *Pippalyadi*, *Mustadi*¹⁷

VAGHBHATA: *Patolyadi*, *Mustadi*, *Pippalyadi*¹⁸

DISTRIBUTION-: This plant is mainly found in the Himalayas, from Kashmir to Sikkim at an elevation of 2,700-4,500 mt. Its rhizome are generally used in the Tibetan & Chinese traditional medicine to treat various ailments like liver disease, fever, asthma, jaundice & also have pharmaceutical values for hepato protective, antiasthma activities^{19, 20, 21}.

CHEMICAL CONSTITUENTS OF KATUKI

The therapeutically potent constituents of the drug essentially comprises of three vital bitter glycosides, namely: Picroside I, Picroside II and Kutkoside. Among them chemically both Picroside and Kutkoside are C-9 monoterpenes. Iridoid glycosides having an epoxy moiety present in the cyclopentane ring. Besides, it also contains organic acids, resin, sugar and tannins along with cucurbitacin glycosides (highly oxygenated triterpenes), apocynin androsin, D-mannitol, Kutkiol, Kutkisterol, Apocyanin, Phenol glucosides, Androsin, and Picein Iridoid glycosides, Kutkin, Picroside I, II, III, IV, V, Kutkoside, Picrorhizin^{2, 4, 22, 23, 24}.



USES OF KATUKI

Medicinal Uses-: *Bhedniya, Dipana, Hridya, Jwaraghna, Shvashara, Kaas hara, Kushtaghna, Kamlahara*²⁵.

Traditional uses-: This plant is used as *Swasa, Daha, Jvara, Kamala, Kustha, and Aruchi*⁴. **PART USED-:** Rhizome¹⁵

DOSE-: 1- 3 gm. of the drug in powder form²³.

IMPORTANT FORMULATION²³-:

Arogyavardhini Gutika is a formulation mainly used for *Pitta Vikar* (disease due to abnormality of *Pitta*) like skin diseases and blood disorders like jaundice, anaemia and useful in poor appetite and one of the major ingredients is *Katuka*.

Tiktaka Ghrita is a formulation mainly used in *Kandu, Meda, Gulma, Grahani and Katuka* is also used to prepare the formulation.

Sarvajvarahara Lauha is an *Ayurvedic* formulation mainly used in *Jirna-Jvara; Pliha-Roga, Yakrit-roga*.

Mahatikataka Ghrita is a formulation found in *Bhaisajya Ratnavali* and used for all chronic skin diseases that are deep in the plasma, blood and muscle tissue with red eruptions and itching. In this formulation one of the main ingredients is *Katuka*.

Therapeutic Uses

- **Hridroga- Katuki** and *Madhuka* are taken with sugar dissolved in water in *Pittaj Hridroga* (*C.S. Ci. 26 & A.H.Ci. 6*)
- **Kushtha- Katuki, Ativisha, Ushira** and *Chandana* are collectively given for internal usage [*C.S.Ci. 7*]

Adulteration -: The stems and roots of the same plant are commonly used to adulterate the rhizomes of *Katuka/katuki*. *Gentiana kurroa* Royle, *Gentiana decumbens* Linn. f., *Gentianatenella* Fries, *Helleboursniger* Linn. are used as substitute for *Katuka*²⁶. Roots of *Picrorhizascrophulariiflora* Pennell, *Actaea spicata*, *Cimicifugafoetida*, *Coptisteeta*, *Cosciniunfenestratum*, *Swertia chirayita* are sold in the drug market under the name *Katuki* or *Karu*²⁷. Roots of *Lagotis glauca* Gaertn. are sometimes intentionally collected and mixed by the local sellers of Kashmir and Kullu regions²⁸.

Pharmacological studies

Anti-asthmatic activity: *P.kurroa* has been studied extensively for its anti-asthmatic activity. The crude extract of *P.kurroa* roots reduced the frequency and severity of asthmatic attacks and the need for regular bronchodilators. The activity has been attributed to compounds such as androsin and apocynin, which have been shown to inhibit allergen and PAF- induced bronchoconstriction²⁹.

Digestive activity: *Picrorhiza* is used in India for the people with constipation due to insufficient digestive secretions²⁹.

Anti-diabetic activity: Extract of *Picrorhiza* was found to lower blood glucose in laboratory animals. Chronic administration of the extract significantly reduced blood sugar in alloxan-induced diabetic rats for 10 days. The extract was also found to reduce the increased blood urea nitrogen & serum lipid peroxides in alloxan-induced diabetic animals and to inhibit the body weight reduction and leukopenia induced by alloxan administration²⁹.

Hypolipemic activity: A hypolipemic effect of the water extract of *Picrorhiza kurroa* was observed in a high fat diet feeding hyperlipemic mouse at doses of 50, 100 and 200 mg/kg, orally, once a day for 12 weeks. Liver weight, serum aspartate transferase (AST), alanine transferase (ALT), low density lipoprotein (LDL), triglyceride and total cholesterol levels were significantly reduced by the treatment. On the contrary, serum HDL level seems not affected by *P. kurroa* water extract³⁰.

Anti-inflammatory activity: Apocynin is a constituent of root extracts of *Picrorhiza* and has been reported to possess anti-inflammatory properties in laboratory animals. Apocynin concentration dependently inhibited the formation of thromboxane A₂, whereas the release of prostaglandins E₂ and F_{2α} was stimulated. Apocynin inhibited arachidonic acid-induced aggregation of bovine platelets, possibly through inhibition of thromboxane formation²⁹.

The rhizome of *Picrorhiza scrophulariiflora* is used to treat inflammatory diseases as a traditional medication. The ethanol extract of *Picrorhiza scrophulariiflora* in rabbits improves accelerated atherosclerosis through inhibition of redox-sensitive inflammation³¹.

Hepatoprotective activity: Alcoholic extract of the plant and kutkin possess hepatoprotective activity. Plant is a potent immunostimulant of both cell mediated and hormonal immunity and exhibits choleric activity in dogs. *Picrorhiza kurroa* is also beneficial in the management of bronchial-asthma²⁹. The hepato-protective effect of *Picrorhiza kurroa* roots have been shown in diverse models of liver injury. The crude extract, and the isolated active principles of the roots have been shown to protect the liver from various types of drug-induced injury isolated compounds from *P. kurroa* have also been shown to have hepatoprotective



activity²⁹. Non-alcoholic fatty liver disease (NAFLD) in rats was cured by giving standard hydro-alcoholic extracts of picrorhiza kurroa. It reduced the lipid content of liver significantly at the dose of 400mg/kg³².

CONCLUSION

Katuki has been one of the important sources of *Ayurvedic* medicine as well as modern medicine. Although it's majorly used for liver disorders, but its active components present in various parts of plant are providing relief and saving millions of life from the very ancient time. Due to wide spectrum of biological activities this plant is widely used in drug industries. Iridoids present in it is also widely known for antitumor, choleric, hypolipidemic, antiphosphodiesterase, cardioprotective, neuritogenic, molluscicidal and leishmanicidal activities³³.

REFERENCE

1. Kar A: *Pharmacognosy and Pharmacobiotechnology*. New age international publishers 2007; 196-197.
2. Anonymous: *The Ayurvedic Pharmacopoeia of India. Part-I, Government of India Ministry of Health and Family welfare Department of Ayush*. 2007; 2: 91- 93.
3. Anonymous: *Agro techniques of some selected medicinal plants. Vol-I. National Medicinal Plants Board. Department of AYUSH, Ministry of Health and Family Welfare Government of India*. 2008.
4. Elizabeth WM: *Major herbs of Ayurveda, The Dabur Research foundation and Dabur Ayurved Limited*. 2002; P.220-222.
5. Kirtikar KK, Basu BD: *Indian Medicinal Plants. 2nd Edition. International Book Distributors*. 1999; 1824-1826.
6. Caraka: *Caraka Samhita. Su Sth.26/68. Caraka Chandrika Hindi vaykhyā. By Dr Tripathi Brahmhanand. Chaukhambha Surabharati Prakashan, Varanasi 2005; 490.*
7. *Susruta: Susruta Samhita. Su Sth.. Edited by Sharma AR. Chaukhambha Surbharati Prakashan, Varanasi 2004; 33.*
8. Ravi TD: *Astanga Samgraha. Su Sth. Chaukhambha Sanskrit Pratishthan, Delhi, 2003; 9/314.s*
9. Sharma PV: *Dhavantari Nighantu. Chaukhambha Oriental, Varanasi. 2006; 36-38/23.*
10. Saramgadhar: *Saramgadhar Samhita. Madhyam Khanda. Edited by Tripathi Brahmhanand. Chaukhambha Surabharati Prakashan, Varanasi. 2004; 6/28: 177.*
11. Bhavamisra: *Bhavprakasa Nighantu. Edited by Pandey G S. Chaukhambha Bharati Academy, Varanasi. 2004; 152/70.*
12. Tripathi I: *RajNighantu. Ed.with Hindi Commentary. By. Chaukhambha Krishnadas Academy, Varanasi. 2006; 139/56.*
13. Vaidya G Bapalala: *Nighantu Adarsa. Chaukhambha Bharati Academy, Varanasi. 2005; 2: 172-176.*
14. Prof. P.V Sharma *Dravyaguna Vijnana, Vol- 2 edition- 2015 Chaukhambha Bharti Academy Varanasi (india)*
15. *A Text Book of Dravyaguna Vijnana, vol-2 Dr. Prakash L. Hegde, Dr. Harini A. edition- 2020 Chaukhambha Sanskrit Sansthan.*
16. (2017) *Pandit Kashinath Shastri, Dr. Gorakhnath Chaturvedi with Vidyotini Hindi Commentary, Chaukhambha Bharti Academy. Reprint 1.*
17. (2017) *KavirajAmbikadutt Shastri, Sushruta Samhita with Ayurveda Tatva Sandipika Hindi Commentary, Chaukhambha Sanskrit Sansthan Varanasi. pp.184,185,187.*
18. *Bhramanand (2015) Tripathi Ashtanga Hridayam with Nirmala Hindi Commentary, pp. 199-202.*
19. Chin YW, Baluns MJ, Chai HB, Kinghron AD: *Drug Discovery from Natural Sources. The AAPS Journal, 2006; 28: 132.*
20. Bantawa P, Ghosh SK, Bhandari P, Singh B, Mondal T, Ghosh PD: *Micropropagation of an Elite line of Picrorhiza scrophulariiflora, Pennell, an Endangered High Valued Medicinal plant of the IndoChin Himalayan region. Medicinal and Aromatic Plant Science and Biotechnology. 2011; 4(1): 1-7.*
21. *Arya Vaidya Sala: Indian Medicinal Plants- a compendium of 500 species. Vol-4. University Press. 2010; 269-270.*
22. Gokhale SB, Kokate CK, Purohit AP: *A text book of Pharmacognosy. 39th ed. Nirali Prakasan. 2004; 179-181.*
23. Sastry JLN: *Illustrated Dravyaguna Vijnan. 15th Ed. Chaukhambha Bharati Academy. 2005; 390-392.*
24. Gogte MV *Vaidya: Ayurvedic Pharmacology and Therapeutic Uses of Medicinal Plants (Dravyaguna Vignyan). Chaukhambha publication, New Delhi. 2009; 325-327.*
25. *Prof. K.C Chunekar Bhavaprakasa Nighantu edition-2020 Chaukhambha Bharati Academy Varanasi (india)*
26. *PV Sharma (1982) Dhanvantray Nighantu.*
27. *J L N Sastry, Tanuja M Nesari (2018) A textbook of Dravya Guna Vijnana, pp.159-162.*
28. Dorsch W, Stuppner H, Wagner H, Gropp M, Demoulin S, et al. (1991) *Antiasthmatic effects of Picrorhiza kurroa: Androsin prevents allergen and PAF-induced bronchial obstruction in guinea pigs. Int Arch Allergy Appl Immunol 95(2-3): 128-133.*
29. *Picrorhiza root: Pharmacology (http://www.mdidea.com/products/new/n ew04806.html). Accessed on 20 September, 2011.*
30. Lee HS, Yoo CB, Ku SK (2006): *Hypolipemic effect of water extracts of Picrorhiza kurroa in high fat diet treated mouse. Fitoterapia. 2006; 77(7-8): 579-84.*
31. Guo ZJ, Hou FF, Liu SX, Tian JW, Zhang WR, Xie D, Zhou ZM, Liu ZQ, Zhang Xun: *Picrorhiza scrophulariflora improves accelerated atherosclerosis through inhibition of redox-sensitive inflammation. International Journal of Cardiology. 2009; 136(3): 315-324.*
32. Shetty NS, Mengi S, Vaidya R, Vaidya ADB (2010): *A study of standardized extracts of Picrorhiza kurroa Royle ex Benth in experimental non alcoholic fatty liver disease. Journal of Ayurveda and integrative medicine. 2010; 1(3): 203-210.*
33. Sah J N, Varshney V K (2013) *Chemical constituents of Picrorhizagenus: a review. American Journal of Essential Oils and Natural Products 1(2): 22-37.*