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Kutki: An important Jadi Buti in ayurveda

Payal V Bakane, Priti A Chincholkar, Amol V Badkhal and Sandip W UmareDOI: <https://doi.org/10.22271/phyto.2023.v12.i5b.14738>**Abstract**

Picrorhiza kurroa commonly acquainted as “Kutki” is a well-known plant within the ayurvedic gadget of medication due to its suggested contribution consisting of antidiabetic, antibacterial, antioxidant, antitumor, anti-inflammatory, and hepatoprotective. The name Kutki have been derived from Sanskrit call 'Katuka' this means that sour taste. But pressure, tension, digestive problems, ache and infection, coronary heart troubles, liver abnormalities or skin sicknesses. One such rare ayurvedic herb, observed within the coronary heart of the Himalayas. However, this evaluation article will help researchers for in additional research.

Keywords: Katuka, *Cucurbitacin*, *Scrophularia*, inflammation, Vata, Doshas**Introduction**

Picrorhiza is derived from the Greek language, because of this “sour” (*Picros*) and “roots” (*Rhiza*). *Picrorhiza* is a genus comprising two species (*Picrorhiza scrophulariiflora pennell* and *Picrorhiza kurroa Royle ex Benth*) of the circle of relatives *plantaginaceae*. *Picrorhiza kurroa* is a perennial herb that can grow up to 20 cm tall at blooming and has a 15-25 cm long branched stoloniferous root stock that persists throughout most of the year. The stem is thin, flimsy, creeping or erect, green, and barely hairy. The majority of the five to 15 cm long leaves are radial, with the cauline either missing or appearing as bract-like structures at the fruiting stage. Very small, white, or pale blue-red flowers with exserted stamens are seen in dense, spicate racemes. Flowers are very small, in dense spicate racemes and white or pale blue-purple coloured with exserted stamens ^[1].

India, the country where the comprehensive system of Ayurveda was born, is inherently blessed by the goodness of Mother Nature. One such taxon with restricted distribution in sub-alpine regions/alpine regions, where its existence is limited to certain habitats, is *Picrorhiza kurroa Royle ex Benth*. It is currently being harvested from the wild on a large-scale basis. Whether or not we are aware of them, medicinal herbs and spices can be discovered growing in all sorts of unexpected places. PIC. Kurroa is a well-known herb in the ayurveda medical system and is mentioned as a crucial treatment by Kashyap (1970) ^[29] and Charak (1949) ^[30] in classical ayurvedic literature ^[2].

Its miles considered as cholagogue, stomachic, laxative in small doses and cathartic in massive doses. Until these days Indian pharmacopoeia additionally indexed *Picrorhiza kurroa* as an official drug (The pharmacopoeia of India, 1970). Kutki has been used within the indigenous system of drugs because a long term had been derived from Sanskrit call 'Katuka' this means that sour taste. In step with the sooner studies literature, its roots possess a good deal bitterness and are used medicinally through the natives. The root is used to treat fever dyspepsia and is described in ayurvedic scriptures as an acrid, stomachic, and in large quantities reasonably cathartic. The *Picrorhiza kurroa* is likewise bitter in flavor marked on its outer element with scaly leaves and cork exfoliates exposing inside the black cortex. The *Picrorhiza kurroa* has scaly leaves and cork that has exfoliated to reveal the black cortex inside and is very bitter in flavour ^[3].

Habitat and distribution are an important alpine herb of Himalayan region growing at an altitudinal range of 3,000 to 5000 m above mean sea level in meadows. Though this plant grows naturally at altitude above 3000 m ASL, it can be cultivated at lower altitudes. It is endemic to Western Himalayas extending up to mountains of Yunnan in China. It has a long creeping rootstock that grows in rock crevices and moist, sandy soil. In Himachal Pradesh it is found in the higher reaches of Chamba, Kangra, Mandi, Shimla, Kinnaur, Lahaul and Spiti districts. In Kashmir Himalayas it grows in high reaches of Gurez valley, Lolab, Keran, Sindh

and Liidder valleys. It is commonly seen associated with the herbs like *Aconitum violaceum*, *Lagotis cashmiriana*, *Potentilla kashmirica*, *Sedum ewersii* and *Senecio jacquemontianus*. It is observed to be common in Gurez, occasional in Lolab and Keran valleys whereas, rare in Sindh valley. Overall, from Kashmir Himalayas, this species is an endangered [4].

a) Rhizome

Rhizome 2.5-6.0 cm long and 0.5-1.0 cm thick, semi-cylindrical, straight, grey brown on the outside, with a rough surface due to longitudinal folds, with round root scars and attached bud scales; The top ends in a growing bud surrounded by a crown of bushy leaves. It has a pleasant smell and a bitter taste. The rhizomes are articulated and zigzagging, cylindrical, regularly curved, with branches and roots in articulated nodes. The rhizome consists of 20-25 cork layers composed of tangentially elongated suberized cells; the cork cambium usually consists of 1-2 layers; Cortex single-layered or absent, in some cases the primary cortex remains, one or two small vascular bundles are present in the cortex; Vascular bundles surrounded by a single-layered endoderm of thick-walled cells; secondary phloem, consisting of phloem pulp and some scattered fibers; 2-4 layer gear; secondary xylem consists of vessels, trachea, xylem fibers and xylem parenchyma, vessels vary in shape and size, have an oblique transverse joint; Trachea long, thick-walled, woody, more or less cylindrical, with blunt and tapering ends; thin-walled and polygonal xylem flesh; the center is occupied by a small nucleus of thin-walled cells; Simple, round to oval starch granules, 25-104 μm in diameter, abundant in all cells [5].

b) Root

The Roots are fine, cylindrical, 51-60 cm long and 0.05 - 0.1 mm in diameter, and are mostly attached to the rhizome; Inner surface black with whitish xylem. The smell is pleasant and the taste bitter. They are greyish to brown in colour and the fracture is hard. The root shoots are irregularly curved and as thick as a little finger. The young root usually has a single-layered cuticle, some cuticle cells lengthen into unicellular hairs; single-layer subcutaneous tissue; the bark consists of 8–14 layers and consists of thick-walled oval to polygonal parenchyma cells; Primary stele, tetrarch to heptarch, surrounded by monolayer pericycle and monolayer thick walled endodermal cells; mature root has 4-15 cork layers, 1-2 cork cambium layers; secondary phloem little developed; secondary xylem composed of vessels, trachea, parenchyma and fibers. The vessels vary in shape and size, some are cylindrical with pointed ends and ends, others are drum-shaped with perforations on the end or side walls; cylindrical trachea with pointed ends; discrete woody fibers, thick-walled, with pointed, blunt, and chisel-shaped ends [6, 10, 13].



Fig 1. *Picrorhiza kurroa* Root

Botanical name: *Picrorhiza kurroa*

Synonyms: Katki, Katu, Katuka, Karukarohini, Katuka

Table 1: Botanical description of *Picrorhiza kurroa*

Taxonomical Rank	Taxon
Kingdom	Plantae
Subkingdom	Tracheobionta
Super-division	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Asteridae
Order	Lamiales
Old Family	Scrophulariaceae
New Family	Plantaginaceae
Genus	<i>Picrorhiza</i>

Distribution

Picrorhiza, an alpine grass typically found above 3,500 meters above sea level, is mainly found in the western and North-Western Himalayas. This has also been noted in parts of the Imperative and North-Eastern Himalayas. These observations were made in the alpine regions of Dhauladhar World Wildlife Reserve (DWLS), HP, and a typical Kutka habitat. The goal of standardized crude drug extraction procedures is to maintain a therapeutically ideal fraction and eliminate unwanted material. Common techniques for obtaining medicinal flora include maceration, infusion and percolation. It is also found in northern Myanmar, western China, and South-Eastern Tibet. It is also grown in the desirable and eastern regions, but is abundant in the northwest [8].

Chemical constituents

More than 50 secondary metabolites of the *Picrorhiza kurroa* plant have been described, including iridoid glycosides. These are mainly iridoids, Acetophenones and Cucurbitacin. The active phytochemical in *Picrorhiza kurroa* is kutkin (bitter phytochemical), which consists of picrosides and kutkosides. The main picrosides found in Kutkin are picrosides I and II, which are ideally iridoid glycosides. Coucuzide and picroside are present in a constant ratio of 1:2. Kutkins are associated with hepatoprotective activity. Picroside III, V and picuroside, 6-feruloylcatalpol, minecoside are present as minor components of iridoid glycosides. Triterpenes are classified as Cucurbitacins. Stuppner *et al.* discovered six new Cucurbitacin derived from this plant. Cucurbitacin have cytotoxic and antitumor effects, other ingredients found in this herb include minecoside, picein, 4-hydroxy-3-methoxyacetophenone, isha kumari *et al.* Ethnobotanical significance of *Picrorhiza kurroa* (kutki), an endangered species [5]. Also Apocyanine, vanillic acid, cinnamon, veronicoside acid, D-mannitol, kutkiol, kutkisterol and ketone as well as phenolic glycosides such as picein and androsine are present. Apocynin (catechol) is naturally anti-inflammatory and prevents the oxidative burst of neutrophils. Androsine would have an anti-asthmatic effect. The dried rhizome of *Picrorhiza kurroa* contains at least 60% of the ingredients 1:1.5 Picroside-I and Kutkoside Blend and Booster 40% is a blend of iridoids and cucurbitacin glycosides. The pharmacological importance of *Picrorhiza kurroa* has been demonstrated by its picroside (Pikrozid-I and Picrozid-II) and other metabolites such as Picroside-III, Picroside-IV, Kutoside, etc. The bioactive compounds picroside and cutoside belong to the iridoid category [6]. In addition to these iridoid glycosides, other smaller iridoids

have also been identified in this plant, such as vernicoside, minecoside, and 6-feruloyl- catalpol, as well as the phenolic glycosides picein and androsine. the snow iridoid picroside glucoside isolated in this way (0.20%), in addition to the already known iridoid glycosides, namely picrozid I (0.78%), picrozid II (0.69%) and 6-feruloylcatalpol (0.00%). 50%) and was characterized as 6-vanniloylcatalpol. Similarly, Mandal and Mukhopadhyay (2004) isolated a new iridoid glucoside, picroside-V. In addition to iridoid glycosides, a total of 23 different cucurbitacin glycosides and an aglucone, phenolic compounds including apocynin/androsine⁴ and vanillic acid¹⁴, and flavonoids were identified in *Picrorhiza kurroa* ^{16, 7}.

Table 2: Phytochemical analysis of Picorhiza root

Sr. No	Phytochemical constituent	Result
1	Flavonoids	Positive
2	Phenols	Positive
3	Saponins	Positive
4	Alkaloids	Positive
5	Proteins	Positive
6	Carbohydrates	Positive
7	Tannins	Absent
8	Amino acids	Absent

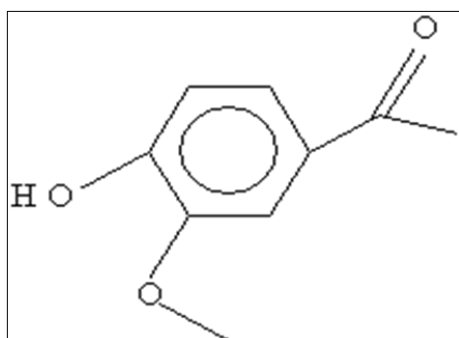


Fig 2: Structure of Apocynin

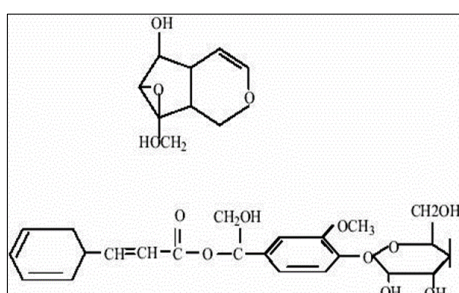


Fig 3: Structure of Kutkins Kutkosides and Picrosides

Qualitative photochemical analysis of *Picrorhiza kurroa* roots and rhizomes revealed the presence of phenols, flavonoids, phytosterols, saponins, alkaloids, proteins, carbohydrates and the absence of tannins and amino acids in the hydromethanolic extracts ¹³.

Traditional and Nutraceuticals Importance

Aids in weight loss

The abundance of flavonoids in Kutki root helps the body shed extra weight faster. Being loaded with fibre and vital vitamins, while taken frequently, the formulations of the bitter herb satiate surprising starvation pangs and prevents overeating and for this reason can play a pivotal position in weight reduction regimen. The herb also reduces the accumulation of LDL (i.e., Low-Density Lipoproteins

or awful LDL cholesterol) in the body, thereby enhancing metabolism and supporting the frame to preserve a right weight ¹¹.

Promotes Heart Functions

Being a potent cardio-protective herb, Kutki is quintessential for treating a host of heart ailments. Owing to its strong antioxidative nature, it strengthens the heart muscles, prevents lipid build up within them, and hence reduces the risk of heart attacks, heart blocks, blood clots, atherosclerosis, etc. It not only plays a crucial role in lowering the levels of cholesterol in the blood but also dilates blood vessels and normalises blood flow, hence managing high blood pressure ^{11, 12}.

Fights Respiratory Issues

Kutki have powerful anti-inflammatory, antibiotic and anti-asthmatic properties and are a well-known traditional medicine for all kinds of respiratory diseases. It is of great importance in treating cold, sore throat, cough, and flu symptoms. It liquefies and loosens secretions from the chest and nasal passages, making breathing easier and helping the body get rid of mucus. It is also useful in treating bronchitis and asthmatic diseases ^{14, 15}.

Shields against Infections

Protects against infections the biochemical contained in this bitter herb have been used to fight germs and protect the body from various infections since ancient times. Thanks to its powerful antiviral, antibacterial and antifungal properties, kutki is used not only to eliminate bacteria and germs from the body, but also to treat recurring fevers. It also helps reduce general weakness, weakness and fatigue and improves the body's vitality ¹⁶.

Supports digestion

Fortified with excellent carminative and digestive properties, Kutki is a one-stop solution to all digestive problems. The anti-bloating properties limit gas formation in the digestive tract, thus reducing gas, bloating, constipation and gas. The herb has an antacid effect that prevents the formation of excessive acids in the stomach, healing indigestion, ulcers and gastritis, and promoting better absorption of nutrients in the body ¹⁷.

Regulates Diabetes

Thanks to their unique hypoglycemic properties, they are of great importance in regulating blood sugar levels in the body. Insulin production by the β -cells of the pancreas is activated when Cuckold or its supplements are ingested. It helps limit the breakdown of starches into glucose, which causes blood sugar to drop and thus helps in the management of diabetes. Take half a teaspoon of Kutki with half a teaspoon of turmeric and a quarter cup of warm water three times a day to control blood sugar levels ^{18, 26}.

Treats Arthritis

The rich anti-inflammatory and anti-arthritic properties of *kutka* root are widely used to relieve pain and inflammation caused by arthritis. It is also extremely effective against rheumatoid arthritis, known in Ayurveda as Amavata, a disease resulting from damage to the Vata dosha and accumulation of Ama in the joints. Prepare a mixture of ¼ teaspoon kutki, ½ teaspoon ginger, and 1 teaspoon castor oil. Mix it with warm water and drink it daily before bed to relieve joint pain ¹⁹.

Promotes skin health

Endowed with antioxidant, antibacterial and anti-inflammatory properties, kutki has blood-cleansing properties that aid in the removal of toxins from the blood, thus aiding in the treatment of skin diseases. Not only does it help protect the skin from radical damage from harmful UVA and UVB rays to reduce the risk of various signs of aging such as wrinkles, blemishes, blemishes, fine lines, and dark circles, but it also treats allergic conditions such as acne and pimples, psoriasis, scabies, and various other skin infections [20].

Kutki for vitiligo

Kutki is a wonderful herb with antipyretic properties and various antioxidants that can heal and soothe the skin in various infections, wounds, and rashes. Vitiligo, a skin condition in which the skin loses its original color and spots appear due to a malfunction of pigment-producing cells, can be prevented with Kutka. Regular use of Kutka on lips, eyes, and other skin areas where vitiligo occurs can prevent its spread. However, it should be noted that Kutki can only delay vitiligo in other areas of the body, but cannot cure the disease [21].

Impact on Doshas

This liver-protecting magical herb contains katu (i.e pungent) and tikta (i.e., bitter) rasa. It is associated with Rukhsha (dry) and Laghu (i.e light) guna. Contains Sheeto Virya (cold power) and Katu Vipaka (hot metabolic property). The bioactive components of this bitter herb balance the pitta (fire and air) and kapha (earth and water) doshas, and an excess can often aggravate the vata (air) doshas [5, 10, 21].

Ayurvedic Formulations of *Picrorhiza kurroa*

1. Arogyavardhini gutika, Tiktaka ghrita, Laghmanjishthadi kwatha, Sarvajvarahara lauha are some important Ayurvedic formulations of *Picrorhiza kurroa*.
2. Arogyavardhini gutika is pitta shamak which works on secretion of bile. It improves the digestion and functioning of liver [25].
3. Tiktaka ghrita is a polyherbal formulation made up many medicinal plants like *Trichosanthes dioica*, *Azadirachta indica*, *Picrorhiza kurroa*, *Alhagi pseudalhagi*, *Fumaria indica*, and *Gentiana kurroo*, *Cyperus rotundus*, *Andrographis paniculata*, *Holarrhena antidysenterica*, and *Piper longum*. This formulation is effectively used against skin diseases, wounds, inflammation, piles, sinus, etc. [26].
4. Laghmanjishthadi Kwatha is another important polyherbal formulation made up of *Manjishtha*, *Triphala*, *Kutki*, *Vacha*, *Daruhaidra*, *Haridra*, *Gudduchi* and *Nimba* which is used as ablood purifier and kaphaghna and kledaghna [27].
5. Sarvajvarahara lauha is an efficient Ayurvedic iron formulation which is used to treat iron deficiency anemia. It significantly increases the Hb regeneration [5, 28].

Summary

One such taxon with restricted distribution in sub-alpine regions/alpine regions, where its existence is limited to certain habitats, is *Picrorhiza kurroa* Royle ex Benth.

Kurroa is a well-known herb in the ayurveda medical system and is mentioned as a crucial treatment by Kashyap (1970) [29] and Charak (1949) [30] in classical ayurvedic literature. The root is used to treat fever dyspepsia and is described in

ayurvedic scriptures as an acrid, stomachic, and in large quantities reasonably cathartic. The *Picrorhiza kurroa* is likewise bitter in flavor marked on its outer element with scaly leaves and cork exfoliates exposing inside the black cortex. Habitat and distribution are an important alpine herb of Himalayan region growing at an altitudinal range of 3,000 to 5000 m above mean sea level in meadows. Cucurbitacin have cytotoxic and antitumor effects, other ingredients found in this herb include minecoside, picein, 4-hydroxy-3-methoxyacetophenone, isha kumari *et al.* Ethnobotanical significance of *Picrorhiza kurroa* (kutki), an endangered species. Being loaded with fibre and vital vitamins, while taken frequently, the formulations of the bitter herb satiate surprising starvation pangs and prevents overeating and for this reason can play a pivotal position in weight reduction regimen. It is powerful antiviral, antibacterial and antifungal properties, kutki is used not only to eliminate bacteria and germs from the body, but also to treat recurring fevers. It is also extremely effective against rheumatoid arthritis, known in Ayurveda as Amavata, a disease resulting from damage to the Vata dosha and accumulation of Ama in the joints. Laghmanjishthadi kwatha is another important polyherbal formulation made up of *Manjishtha*, *Triphala*, *Kutki*, *Vacha*, *Daruhaidra*, *Haridra*, *Gudduchi* and *Nimba* which is used as a blood purifier and kaphaghna and kledaghna.

Conflict of Interest

The authors have stated that there is no conflicts of Interest

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