



## RESEARCH ARTICLE

# PICRORHIZA KURROA: NATURE'S BENIGNITY UNDER THREAT

Anil Kanaujia<sup>1</sup>, Neha Bhatt<sup>2</sup>, Ranjan Kumar Rakesh<sup>2</sup>, Puneet Pathak<sup>1\*</sup>, Mohan Ji Saxena<sup>1,2</sup> and Anup Kalra<sup>12</sup>

<sup>1</sup>Quality Certified and Standardized Herbals Pvt. Ltd., 3<sup>rd</sup> Floor, Sagar Plaza, District Centre, Laxmi Nagar, Vikas Marg, New Delhi, India; <sup>2</sup>R&D Centre, Agriliv Research Foundation, Village Chidana, Tehsil Gohana, Sonipat, Haryana, India

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\*Corresponding author: Puneet Pathak

### ABSTRACT

Export of cultivated MAPs (Medicinal and Aromatic Plants) is certainly valuable for conservation and rural economy. Global Picrorhiza Extract Market size was valued at US\$ 2.01 Bn in 2022 and the total revenue is expected to grow at 3.8% through 2023 to 2029, reaching nearly US\$ 2.62 Bn. This herb Kutki is in high demand in national and international markets due to its vast medicinal properties. The over exploitation and unsustainable harvesting have posed an alarming threat to the existence of this important species, and its population has declined drastically. Realizing the disappearing population this plant was listed as an endangered species in Appendix II of the Convention on International Trade in Endangered Species (CITES).

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## INTRODUCTION

*Picrorhiza kurroa* Royle ex Benth (Family Scrophulariaceae; Order Scrophulariales) commonly known as kutki or kadu, is a small, hairy, creeping and herbaceous medicinal plant present in the alpine Himalayan region from Kashmir to Sikkim at an elevation of 2700 m–4500 m above mean sea level. It grows in rock crevices and moist, sandy soils with long creeping rootstocks. It contains the active principal components i.e. kutkin and is comprised of kutkoside and the iridoid glycosides (Picoside I and Picoside II) which are used in more than 2000 herbal formulations. Dried roots and rhizomes are the economic part of plant. In terms of the economic value of traded materials, it is on the list of 15 plant species traded in India. Global annual demand of this herb is 500 tons and supply is 375 tons, out of this India alone contributes only 75 tons/year.

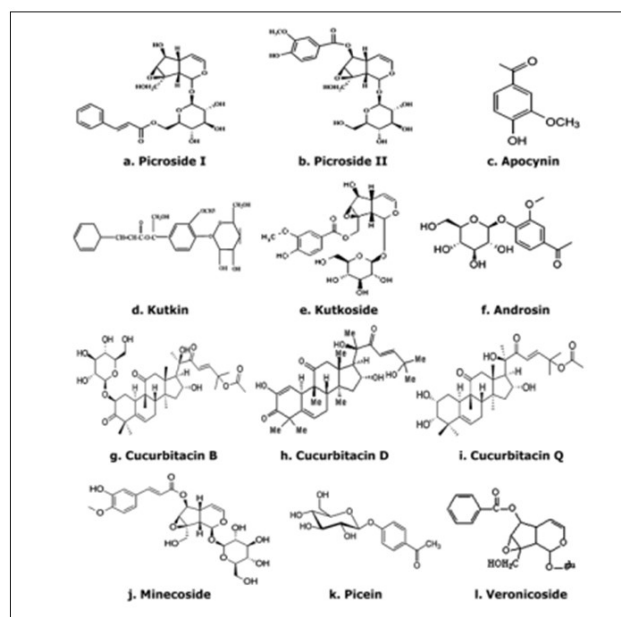
**Propagation:** Propagation of *P. kurroa* can be achieved sexually or asexually from seeds, rhizomes and stolons. To maintain quality and uniformity of the plant, it is propagated through stolon cuttings. Approximately 1.0–1.5 kg of seeds are required for raising plants in 1 hectare of land.

**Soil requirements:** Sandy loam soil rich in organic carbon and porous humus texture is the best for its cultivation. Moisture level should be maintained but should not be over-moist (Debnath, 2020).

**Phytochemistry:** The phytochemical nature of *P. kurroa* has been extensively studied and various examinations have led to the identification of 132 active ingredients from different parts of the plant such as roots, stem, leaf and seeds. The species consists of kutkin which is the major ingredient and involves picrosides I, II, and III and kutkoside. The different extracts of *P. kurroa* has also been found to contain phytochemicals such as veronicoside, pikuroside, cucurbitacins, 4-hydroxy-3-methoxy acetophenone and phenolic compounds. Further recognized phytochemicals include apocyanin and drosin etc (Salma et al., 2017).

**Biological and pharmacological activity:** Kutki in Ayurveda, is widely used since antiquity in traditional system of medicine for its varied pharmacological activities. It is vividly explained in Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya as well as in later Nighantus (<https://www.expresspharma.in/conservation-of-endangered-medicinal-species-picrorhiza-kurroa/>).

The rhizomes of Kutki are widely used in Indian traditional medicine for its effectiveness as an antibiotic. It is also described by Ayurvedic literature as jvaraghna (antipyretic) and visaghna (detoxifying). Other traditional uses of Kutki include the treatment of asthma, jaundice, fever, malaria, snakebite, and liver disorders.

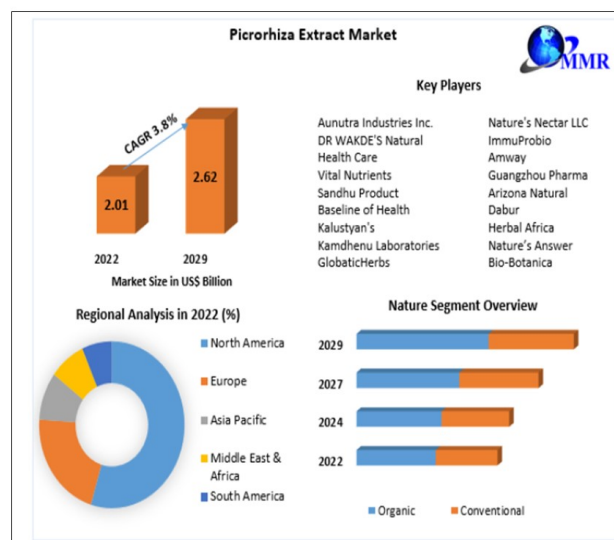


It is one of the major components of Arogyavardhini, an effective Ayurvedic preparation used to treat liver diseases. The bioactivity of *P. kurroa* is antimicrobial, antibacterial, antimutagenic, cardioprotective, hepatoprotective, antimalarial, antidiabetic, antiinflammatory, anticancer, antiulcer, and nephroprotective activities. *P. kurroa* yields a crystalline product called “kutkin” which is a mixture of two major C9 iridoid glycosides such as picroside-I and -II and kutkoside, used in more than 2000 herbal formulations. A number of studies have reported the antiviral activity against SARS-CoV-2, Chikungunya virus, and HIV of *P. kurroa* phytoconstituents (<https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/picrorhiza>). Herbal-based therapeutics have been used for a long time in India for liver disorders. Preclinical and human studies carried out in the last two decades have conclusively shown that some of the Indian medicinal plants (*P. kurroa*, *Morinda citrifolia*, *Andrographis paniculata*, *Phyllanthus niruri*, and *Eclipta alba*) and the polyherbal formulations (Liv 52, Livergen, Octagen, Stimuliv, Tefroliv) made from these plants are effective as hepatoprotective agents (<https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/picrorhiza>).

**Nature's benignity under threat:** Since a few decades ago, unlawful collectors have found success in exploiting this species from the wild for commercial purposes. This herb is in high demand in national and international markets due to its vast medicinal properties. The over-exploitation and unsustainable harvesting have posed an alarming threat to the existence of this important species, and its population has declined drastically. Realizing the disappearing population of Kutki, this plant was listed as an endangered species in Appendix II of the Convention on International Trade in Endangered Species (CITES), a multi-lateral treaty drafted by the member nations of the International Union for

Conservation of Nature (IUCN). This has made it mandatory to get a Legal Procurement Certificate (LPC) for manufacturers and traders to export any Kutki-based products (<https://www.expresspharma.in/conservation-of-endangered-medicinal-species-picrorhiza-kurroa/>).

**Picrorhiza Extract Market – Global Industry Analysis and Forecast (2023-2029):** Global *Picrorhiza* Extract Market size was valued at US\$ 2.01 Bn in 2022 and the total revenue is expected to grow at 3.8% through 2023 to 2029, reaching nearly US\$ 2.62 Bn. The *Picrorhiza* Extract market report is a comprehensive analysis of the industry, market, and key players. The report has covered the market by demand and supply side by segments. The global *Picrorhiza* Extract market report also provides trends by market segments, technology, and investment with a competitive landscape. Global *Picrorhiza* Extract Market size was valued at US\$ 2.01 Bn in 2022 and the total revenue is expected to grow at 3.8% through 2023 to 2029, reaching nearly US\$ 2.62 Bn. The *Picrorhiza* Extract market report is a comprehensive analysis of the industry, market, and key players. The report has covered the market by demand and supply side by segments. The global *Picrorhiza* Extract market report also provides trends by market segments, technology, and investment with a competitive landscape.



**Picrorhiza extract market segment analysis:** Based on nature the *Picrorhiza* market is segmented into organic and conventional, of which the segment of organic *Picrorhiza* extract dominated the market due to its increased use and more benefits than conventional picrorhiza extract. Although, the conventional extract market segment has also seen growth due to its increased use as a dietary and herbal supplement. This supplement is biotechnical and derived from plants, roots, seeds, and fruits that can be added to diet supplements. The conventional extract consists of chemicals and other synthetic compounds in products. The Asia Pacific region, being a native place of origin for *P. kurroa* has dominated the global *P. kurroa* extract market due to the high production, consumption, and use of *P. kurroa* plants and herbs in the region. As *P. kurroa* herbs are mainly found in the Himalayan region of India, Nepal, and Tibet, the region has seen an upsurge in the demand for *Picrorhiza* plants.

Mainly due to increased knowledge and per capita income. However, less availability of raw materials and excessive demand hampered the market growth. India, China, and Japan are the major contributors to the region's market growth. North America and Europe have also seen growth rates in recent years, North America is the biggest importer of *Picrorhiza* extract and is expected to register the fastest market growth due to the increased use of herbal supplements by young populations and gym enthusiasts. It's been also used to treat various health conditions as herbal medicine. In Europe, picrorhiza extract is been used as part of dietary supplements due to it being a rich source of antioxidants and increased investments in research and development has propelled the market growth in the region. The Middle East and Africa have also registered growth but at a slow rate. MEA is also the biggest importer of *Picrorhiza* extract to produce and develop therapeutic drugs. These drugs come in different types such as antiviral, antifungal, antibiotic, antidepressant, and others which have a huge demand in the global market, thus the region is anticipated to account for high growth during the forecast period (<https://www.maximizemarketresearch.com/market-report/global-picrorhiza-extract-market/109688/>).

**Conservation for long-term sustainability and global prospects:** In the financial year 2021-22, *Kutki* extracts worth Rs 4.7 million only could be exported from India. Moreover, the process of going through the steps for cultivation and procurement of the raw material for production of extract is rather laborious. Apart from that, it is essential to obtain Legal Production Certificates and Legal Procurement Certificates from the appropriate authorities for its production and procurement, and a CITES export permit is needed to export its extracts. Due to this, *Kutki* exporters struggle to obtain the raw materials needed for manufacturing and exports. Additionally, low per capita land holding for cultivating the crop in the Himalayan region and a long gestation period for cultivation – 2.5 to three years of the crop are further impediments (3).

Export of cultivated MAPs is certainly valuable for conservation and rural economy. However, export of MAPs requires scientific rigour and also rigour in maintaining the practice for decades and working within the existing policies (Chandra, 2016). Cultivation of *P. kurroa* is useful for its conservation and sustainable supply. Average productivity of *P. kurroa* is estimated to be around 500 kg/ha.

The gross profit is almost 3.34 times better from export of *P. kurroa* compared to usual marketing (<https://www.maximizemarketresearch.com/market-report/global-picrorhiza-extract-market/109688/>). Therefore, in order to make this species widely available for healthcare, more stakeholders and major companies in the herbal sector need to come forward (<https://www.expresspharma.in/conservation-of-endangered-medicinal-species-picrorhiza-kurroa/>).

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