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Research Article

PHARMACOGNOSTICAL EVALUATION OF *KATUKA* (*PICRORHIZA KURROA* ROYLE EX BENTH.)

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ABSTRACT

Now days, one of the major lacunae in the Ayurvedic system of medicine is adulteration of medicinal plant species i.e. raw drug. Drug sellers for their financial gains adulterate the raw drugs with cheap, similar looking drugs or other substances. So, it has become necessary for the Ayurvedic physicians and pharmaceuticals to identify the raw drug before its clinical use. There is a need to set the standards for proper identification of the raw drug. So, this study was designed to establish various pharmacognostical standards which can help in ensuring identification of *Katuka*, a well known herb in Ayurvedic medicine. Botanically, the drug *Katuka* is *Picrorhiza kurroa* Royal ex. Benth belonging to the family Scrophulariaceae. *Katuka* is a valuable bitter tonic and is mainly used in Ayurveda for its hepatoprotective action. Its rhizome is used for medicinal purpose. So, macroscopical and microscopical characters of intact and powdered rhizome were studied. Macroscopic study of rhizome and its powder indicated the organoleptic characters like size, shape, colour, odour, taste and texture. Microscopic study of T.S. of rhizome showed the presence of cork, cortex, vascular cambium, xylem, phloem, pith and pith ray. Microscopic study of powder of rhizome showed the presence of starch grain, cork cells, xylem vessels, and pith cell with pitted wall thickenings, tracheid and lignified fiber. Pharmacognostical characters of rhizome of *Katuka* revealed from this study will help in standardization of this raw drug and preventing adulteration in the herbal raw drug market.

KEYWORDS: *Katuka*, *Picrorhiza kurroa* Royle ex Benth., Pharmacognostic study.

INTRODUCTION

In present time, to ensure the safety and efficacy of Ayurvedic medicines, there is a great need of quality control. Foremost component of quality control is the accurate identification of the raw drug. If the quality of raw drug is bad, the product is bound to be bad. Now days, adulteration of the medicinal plant species i.e. the raw drug has become a major problem in the Ayurvedic system of medicine. So, it has become necessary to authenticate the raw drug before its clinical use by evaluating its macroscopical and microscopical characters. As each and every species has its own characteristic features which determine the authenticity of that particular drug. These characteristic features are explored by pharmacognostical study.

Picrorhiza kurroa is found in the alpine Himalayas from Kashmir to Sikkim, at an elevation of 3,000m to 5,000m above mean sea level. In Himachal Pradesh, *Katuka* is found in Thamsar and Dainasar areas of Bara and Chhota Bhangal, respectively in Kangra district; Pangi - Bharmour (Jutadhar and Mani Mahesh) of Chamba district, Lahaul, Kinnaur, Rohtang Pass in Kullu and Shimla districts above 3,200m elevation especially in rocky slopes. Here, locally it is known as *Karu*. The plant is self-regenerating but unregulated over harvesting has caused it to be endangered.[1]

Katuka is a small perennial herb with a jointed zig-zag, elongated, creeping rhizome. Root stock is thick, clothed with scars of withered leaf bases. Leaves are simple, alternate, serrated with winged sheathing petiole. Flowers are bluish-white or pale blue-purple. Its rhizomes are used for medicinal purpose.[2] It is most valued for its hepatoprotective effect, but it also shows anti-inflammatory, anti-oxidant, choleretic and immunomodulatory actions.[3] Rhizomes of *Katuka* are commonly used for the preparation of many Ayurvedic formulations like *Arogyavardhini gutika, Tiktaka ghrita, Mahatiktaka ghrita, Sarvajvarahara lauha* etc.[4]

The rhizomes of *Katuka* are commonly adulterated with the stems and roots of the same plant. *Gentiana kurroa* Royle, *Gentiana decumbens* Linn. f., *Gentiana tenella* Fries, *Hellebours niger* Linn. are used as substitute for *Katuka*.[5] Roots of *Picrorhiza scrophulariiflora* Pennell, *Actaea spicata*, *Cimcifuga foetida, Coptis teeta, Coscinium fenestratum,*

Swertia chirata are sold in the drug market under the name *Kutaki* or *Karu*.[2] Roots of *Lagotis glauca* Gaertn. are sometimes advertently collected and found mixed with the material obtained from Kashmir and Kullu regions.[6] So, there is a need for proper standardization of this drug. Present study has been taken to investigate the organoleptic and microscopic characters of rhizome of *Picrorhiza kurroa* Royal ex. Benth.

AIMS AND OBJECTIVES

1. To evaluate macroscopic characters of *Picrorhiza kurroa* rhizome and its powder by organoleptic methods.
2. To study microscopic characters of rhizome of *P. kurroa.*
3. To study powder microscopy of rhizome of *P. Kurroa.*

MATERIALS AND METHODS

A) Materials

The usable part of *Katuka* is rhizome, thus only rhizome and its powder were studied for macroscopic and microscopic characters. Photomicrographs were taken by using canon digital camera attached to trinocular microscope, Leica (ATC 2000) in R.G.G.P.G. Ayurvedic College, Paprola.

B) Sample collection

The rhizomes of *P.kurroa* were purchased from the Paprola market. The authenticity of the sample was confirmed by comparing their characters with various floras in P.G. Dept. of Dravyaguna, R.G.G.P.G. Ayurvedic College, Paprola.

C) Processing and Preservation of sample

The purchased drug was sorted out for foreign matter, washed properly in shade. After drying, the drug was finely powdered in disintegrator and then sieved in 80 mesh sieve. It was then packed and stored in air tight containers till further use.

D) Pharmacognostical study

1. Macroscopic study

Macroscopic characters of *P. kurroa* rhizome and its powder were evaluated using organoleptic methods like size, shape, texture, colour, odour, taste. Organoleptic methods include the tests that can be done by one's sensory organs and quality of drug can be assessed upto some extent.[7-9]

2. Microscopic study

i) Rhizome

Dried rhizome was soaked overnight in distilled water, then transverse section was taken and photomicrography was done after proper staining and mounting.

j) Powder microscopy

Powder of the rhizome was studied microscopically and photomicrography was done after proper staining and mounting.[7-9]

3. Microchemical tests

Some micro-chemical tests were performed to detect starch grains and lignified elements.

k) Test for starch grains:

Powder was treated with a drop of iodine. Starch grains turned blue when examined microscopically.

l) Test for fibers (lignified elements):

Powder was treated with phloroglucinol and hydrochloric acid.

Sclerenchymatous fibers turned pink in colour.[7-9]

RESULT

1. Macroscopic study

Organoleptic characters of rhizome of *P. kurroa*

Figure1.Rhizome of *P. kurroa*

Shape - Straight or slightly curved, cylindrical.
- Outer surface bears impressions of round root scars and numerous fish like scales
- Transversely cut portion shows large creamish vascular bundles arranged in a prominent circular broken ring

Size - 2.5 to 12 cm long and 4-10 mm in diameter

Colour - Outer surface is creamish - brown in colour
- On breaking it shows smooth black / dark brown surface

Odour - Faint, disagreeable

Taste - Very bitter and long lasting

Fracture - Short and clear

Organoleptic characters of powder of *P. kurroa* rhizome are as follows:

Figure2. Powder of *P. kurroa* rhizome

Sr. No.	Parameters	Results
1.	Texture	Fine powder
2.	Colour	Dusty grey
3.	Odour	Faint, disagreeable
4.	Taste	Very bitter, long lasting

2. Microscopic study

i) T.S. of rhizome (*Picrorhiza kurroa* Royle ex Benth.)

Cork

20-25 layers of cork consisting of tangentially elongated, suberized cells, cork cambium 1- 2 layered.

Cortex

Single layered or absent, primary cortex persists in some cases.

Vascular bundles

1 or 2 small vascular bundles present in the cortex. Vascular bundles surrounded by fibrous bundle sheath.

Phloem

Secondary phloem composed of parenchyma cells and a few scattered fibers.

Vascular cambium

2- 4 layered.

Xylem

Secondary xylem consists of vessels, tracheids, fibres and parenchyma cells. Vessels vary in size and shape, have transverse oblique articulation; tracheids long, thick walled, lignified, more or less cylindrical with blunt tapering ends. Starch grains abundant.

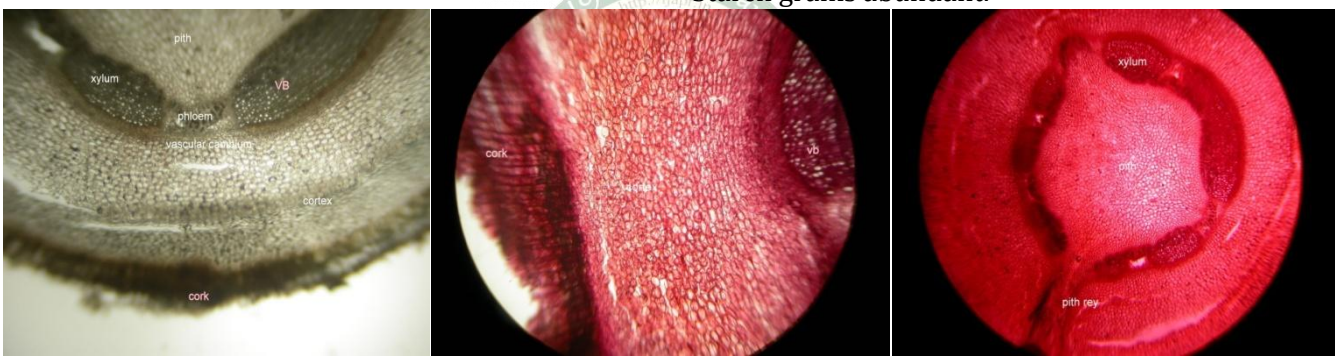

Figure3. T.S. of rhizome of *Picrorhiza kurroa* Royle ex Benth.

ii) Powder microscopy of rhizome (*Picrorhiza kurroa* Royle ex Benth.)

Powder microscopy of *Picrorhiza kurroa* rhizome shows following characters:

a) Cork cells

b) Starch grains

c) Lignified fibers

d) Tracheids

e) Pith cell with pitted wall thickenings

2. Microchemical tests

The observations and results are tabulated below:

Sr. No.	Test	Observations	Characteristics
1.	Powder + Iodine solution	Blue	Starch grains
2.	Powder + Phloroglucinol + HCL (1:1)	Pink	Lignified fibres

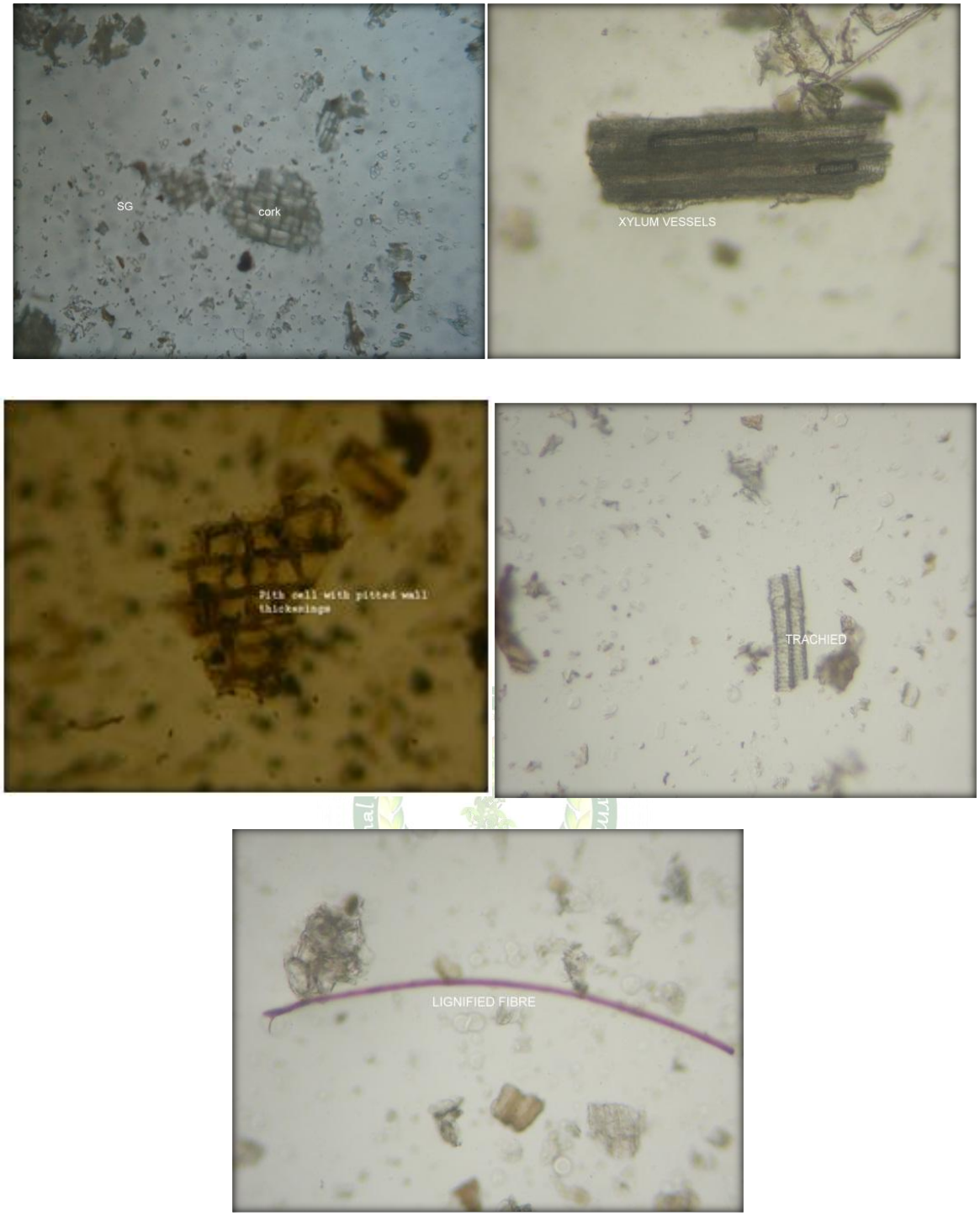

Figure4. Powder microscopy rhizome of *Picrorhiza kurroa* Royle ex Benth.

All these characters were compared with the reported one in Ayurvedic Pharmacopoeia of India. These characters were found to be identical.

DISCUSSION

For the establishment of identity of herbal drugs standardization is the need of the hour. Macroscopic and microscopic evaluation of *Picrorhiza kurroa* Royle ex. Benth had been carried out in this study. Organoleptically rhizomes of *Picrorhiza kurroa* were cylindrical, straight or slightly curved in shape. Externally colour was creamish – brown. Surface was rough due to the presence of various fish like scales. Taste was very bitter. Fracture was short and clear showing large creamish vascular bundles arranged in a prominent circular broken ring. In microscopic study transverse section of rhizome showed 20-25 layers of cork, 1-2 layered cork cambium and primary cortex. Phloem and xylem vessels constituted the vascular tissue with pith in the centre. Cork cells, starch grains, lignified fibers, trachieds and pith cells with pitted wall thickenings

were found in powder microscopy of *Picrorhiza kurroa* Royle ex. Benth.

CONCLUSION

Botanically the drug *Katuka* is *Picrorhiza kurroa* Royle ex Benth., and it belongs to family Scrophulariaceae. The usable part of *Katuka* as medicine is its rhizome. So, pharmacognostical study of its rhizome was done to check its authenticity. The macroscopical and microscopical examination of rhizome confirmed its identity as *Katuka* (*Picrorhiza kurroa* Royle ex Benth.).

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