

PHARMACOGNOSTIC AND PHYTOCHEMICAL EVALUATION OF LEAVES OF *Putranjiva roxburghii*

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ABSTRACT

Putranjiva is an important drug mentioned in the traditional medicinal texts. Recent pharmacological findings indicate that leaves of *Putranjiva roxburghii* possess significant febrifuge and sterility activity which comply with the claims made in the traditional medicinal texts. However, no conclusive pharmacognostic study or phytochemical investigation of these leaves has been performed yet. The present work deals with the qualitative and quantitative pharmacognostic and phytochemical evaluation of the leaf material of *Putranjiva roxburghii*. Diagnostic characters of powder include unicellular and multicellular cystolith covering trichomes, actinocytic stomata and pitted xylem vessels. Phytochemical analysis showed the presence of important classes of phytoconstituents like cardiac glycosides, anthraquinone glycosides, saponin glycoside, flavonoids, phenolics, alkaloid, sterols, triterpenoids and carbohydrates. This study would help to pave the way for further isolation of phytoconstituents, therapeutic investigations and standardization of formulations containing its leaf material.

Keywords: *Drypetes roxburghii*, Euphorbiaceae, Jivputrak. Putranjiva, *Putranjiva roxburghii*.

INTRODUCTION

Putranjiva roxburghii syn. *Drypetes roxburghii* (Euphorbiaceae) is also known as Jivanputra, Putranjiva, Kumarajiva, Mava, Pavitra and Putrajiva in Sanskrit. Leaves, fruits and stones of fruits are given in colds and fevers, also in rheumatic affections. Rosaries, made of hard stones of the fruit, are placed around the necks of children to protect them from diseases.¹ The present investigation deals with the qualitative and quantitative microscopic evaluation of the leaf material and its phytochemical evaluation.

MATERIALS AND METHODS

Collection of plant material

Leaves *P. roxburghii* were collected from the herbal garden of RK College of Pharmacy, Rajkot, Gujarat in June, 2011. Herbariums and voucher sample were prepared and deposited in Department of Pharmacognosy, RK College of Pharmacy (Voucher no. RKCP/COG/20/2011).

Pharmacognostic studies

Morphology of fresh leaves of *P. roxburghii* was studied. Photomicrography of stained and unstained transverse sections of fresh leaves was performed. Leaf constants were established using camera lucida. The leaves were dried under shade, powdered to 60#, stored in airtight containers and used for powder study and quantitative microscopy (Table 1).²

Phytochemical study

The powder was extracted with 100ml of different solvents at 70°C for two hours each. Various phytoconstituents present in the leaves were detected by

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their respective chemical tests using the appropriate extracts (Table 2).³⁻⁷

RESULTS AND DISCUSSION

Pharmacognostic study

Macroscopy

Leaves are simple, 5- 9.5 x 1.5-3.5 cm, elliptic-ovate, apex acute, margin serrate, surface glabrous and glaucous, texture membranous, base asymmetric and venation reticulate. Color of upper surface was dark green and lower surface was light green. Petiole is 0.4-1.0 cm long, midrib nearly flat, secondary nerves 9-12 pairs. No characteristic odor or taste was observed. (Figure 1).

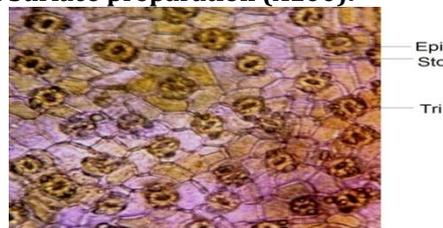
Figure 1. Leaves of *putranjiva roxburghii*.



Microscopy

Surface: Epidermal cells are beaded walled, having actinocytic stomata and unicellular and multicellular cystolith covering trichomes (Figure 2).

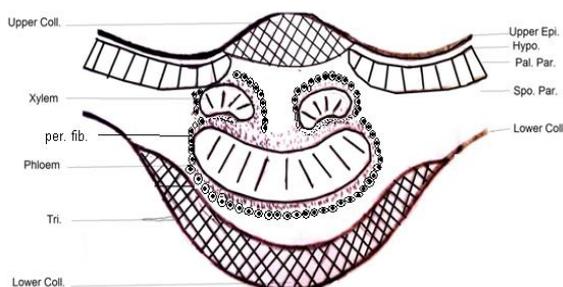
Figure 2. Surface preparation (X100).



(Sto-stomata; Epi-epidermis; Tri-trichome)

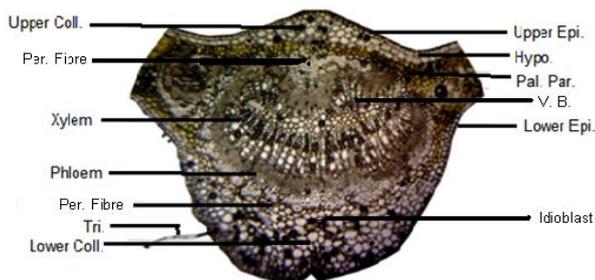
Transverse section: Lamina of transverse section shows an upper epidermis covered by thin cuticle. Unicellular and multicellular cystolithic covering trichomes are present mainly on the lower epidermis. Underlying the upper epidermis is a bi-layered, compact, radially elongated palisade followed by spongy mesophyll composed of 3-4 layers of loosely arranged parenchymatous cells. Midrib consists of well-developed collenchyma beneath the epidermis. Vascular bundles are bicollateral and crescent shaped. Continuous layers of lignified pericyclic fibres with a small lumen are found surrounding the vascular bundles. Ground tissue consists of loosely arranged polygonal parenchymatous cells, some of which are have scattered prism crystals of calcium oxalate. Several idioblasts filled with cystolithic crystals of calcium carbonate are also found in the ground tissue. These cystoliths are also found in many multicellular covering trichomes of the leaf (Figure 3, 4, 5).

Figure 3. Schematic diagram of Transverse section of leaf.



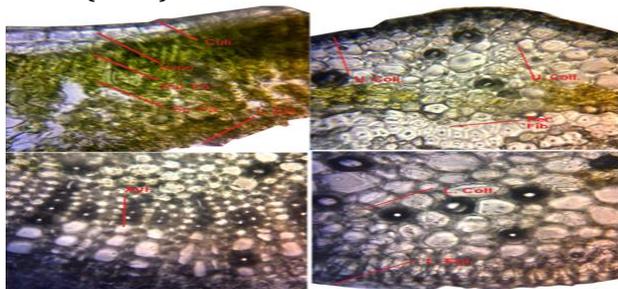
(Upper Coll.-Upper Collenchyma; Upper Epi.- Upper Epidermis; Lower Coll.-Lower Collenchyma; Lower Epi.- Lower Epidermis; Pal. Par.-Palisade Parenchyma; Tri.-Trichomes; Hypo.- Hypodermis, Per. Fibre - Pericyclic Fibres, V.B.- Vascular Bundle.)

Figure 4. Detailed Transverse section of leaf (X100)



(Upper Coll.-Upper Collenchyma; Upper Epi.-Upper Epidermis; Lower Coll.- Lower Collenchyma; Lower Epi.- Lower Epidermis; Pal. Par.-Palisade Parenchyma; Tri.-Trichomes; Hypo.- Hypodermis, Per. Fibre - Pericyclic Fibres, V.B.- Vascular Bundle)

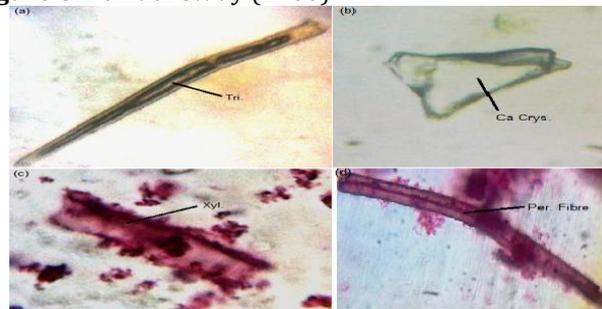
Figure 5. Transverse section of leaf showing enlarged portions (X400)



(Cuti. - Cuticle; U. Coll.- Upper Collenchyma; U. Epi.- Upper Epidermis; L. Coll.- Lower Collenchyma; L. Epi.- Lower Epidermis; Per. Fib.- Pericyclic Fibres; Pal. Pa.- Palisade Parenchyma; Xyl.- Xylem; Phl.- Phloem; Tri.- Trichomes; Sp. Pa.-Spongy parenchyma; Hypo.- Hypodermis)

Powder characteristics: The powdered drug is dark brown with no distinct odor or taste. The important diagnostic features of the powder include abundant cystolithic covering trichomes, prisms of calcium oxalate, pitted xylem vessels and pericyclic fibres (Figure 6).

Figure 6. Powder study (X400)



{(a) Tri.- cystolithic covering trichomes; (b) Ca.Cryst.-calcium oxalate crystal; (c) Xyl.- fragment of xylem vessel; (d) Per. Fibre- pericyclic fibre}

Table 1. Quantitative microscopy.

Leaf constant	Mean ± SD
Stomatal Number	
Upper surface	2
Lower surface	33
Stomatal Index	
Upper surface	0.5 ± 0.25
Lower surface	0.2142 ± 0.5
Vein islet number	5 ± 1
Vein termination number	2 ± 1

Number of observations = 5; SD = Standard Deviation

Phytochemical study

Presence of various phytoconstituents in the leaves was detected by their respective chemical tests using the appropriate extracts (Table 2).

Table 2. Phytochemical screening.

Phytoconstituent	Test	Result
Alkaloids	Dragendorff's test	+ve
	Hager's test	+ve
	Wagner's test	+ve
	Mayer's test	+ve
Flavonoids	Shinoda test	+ve
	Lead acetate test	+ve
Phenolics	Ferric chloride test	+ve
	Folinicocalteu test	+ve
Sterols and triterpenoids	Salkowski test	+ve
	Liebermann-Buchardt test	+ve
Cardiac glycosides	Legal test	+ve
	Baljet test	+ve
	Keller Killiani test	+ve
Saponin glycosides	Foam test	+ve
	Lead acetate test	+ve
Anthraquinone glycosides	Borntrager test	-ve
	Modified Borntrager test	-ve
Carbohydrates	Fehling's test	+ve
	Molisch test	+ve

CONCLUSION

The present work deals with the microscopic and phytochemical evaluation of the leaves of *Putranjiva roxburghii*. Diagnostic characters of powder include unicellular and multicellular cystolithic covering trichomes, prisms of calcium oxalate, pitted xylem vessels and pericyclic fibres. Phytochemical analysis showed the presence of important classes of phytoconstituents like cardiac glycosides, saponin glycoside, flavonoids, phenolics, alkaloid, sterols, triterpenoids and carbohydrates. This indicates that the plant can be useful for treating different diseases because the therapeutic activity of a plant is due to the presence of particular class of compounds. Development of such a monograph would pave the way for isolation of phytoconstituents, further therapeutic investigations and standardization of formulations of *Putranjiva roxburghii*.

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REFERENCES

1. Khare C P; *Indian Medicinal Plants: An Illustrated Dictionary*. New York, Springer. 2007; 227.
2. Khandelwal K R, Kokate C K, Gokhale S B; *Practical pharmacognosy techniques and experiments*. Nirali Prakashan, Pune. 1996; 100-48.
3. Feigl F; *Spot tests in organic analysis*. 4th ed. London, Elsevier. 1956; 237-45.
4. Fishcher R; *Praktikum der pharmakognosic*. 3rd ed. Berlin: Springer Verlag. 1952; 362.
5. Geissman A; *Modern methods of plant analysis*. Vol III. Berlin: Springer Verlag. 1955; 434-73.
6. Harborne J B; *Phytochemical methods*. 2nd ed. London: Chapman & Hall. 1973; 42-131.
7. Robinson T; *The organic constituents of higher plants, their chemistry and interrelationships*. Minneapolis: Burgers. 1964; 64.