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Research Article

PHARMACOGNOSTIC EVALUATION OF STEM AND ROOT OF *Rivea hypocrateriformis* (Desr.) Choisy

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Abstract

Rivea hypocrateriformis (Desr.) Choisy (Convolvulaceae), a less silky – pubescent climber, popular as phang or Phanji in Odisha and Gujarat, is being consumed as a leafy vegetable and reported for antiimplantation, antioxidant and hepatoprotective and anti inflammatory activities. Its stem and root were studied for their macroscopic, microscopic including powder characters and histochemical tests, following standard procedures. Results showed septate fibers, annular border pitted vessels, tannin, rosette crystals of calcium oxalate and some simple and compound starch grains etc. in stem. Root shows the presence of Schlerides, Pitted stone cells, border pitted vessels, tannin, oil globules, rosette crystals of calcium oxalate and some simple and compound starch grains.

Key words: Phanji, Histo-chemical, Pharmacognosy, *Rivea hypocrateriformis.*

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INTRODUCTION

Rivea hypocrateriformis (Desr.) Choisy (Convolvulaceae), a large climber, found in Kokan, Deccan, Poona, Western peninsula, Assam[1] and is considered as the botanical source of Phanji, a classical drug of Ayurveda.[2] Internal administration of its stem relieves cough and headache[3] and root in the treatment of piles.[4] Researches show that its stem contains two new bergenin derivatives;[5] stem possess anti-inflammatory activity;[6] aerial parts possess antioxidant property, Hepatoprotective[7] and antiimplantation.[8] Though reported for many pharmacological activities and investigated for phytoconstituents, the plant is not reported for its detailed pharmacognostical characters, except its leaf.[9]

Hence, the present study was undertaken to establish certain botanical standards for identification and standardization of *R. hypocrateriformis* stem and root.

MATERIAL AND METHODS

Collection and preservation of the sample

Plant identification was done with the help of Forest flora of Gujarat state.[10] the whole plant of *Rivea hypocrateriformis*, was collected from Jamnagar, Gujarat (Rakha khatia forest area) during October 2012 and after authentication by expert taxonomist, sample specimen was deposited in Pharmacognosy museum (Specimen Number: PHM/6063/21/09/2012) for future references. The stem and root were separated from the collected plant, washed, shade dried, powdered, sieved through 80 mesh and preserved in an air-tight container. Fresh sample of stem and root were preserved for microscopical evaluation, in a solution prepared from 70% ethyl alcohol: glacial acetic acid: formalin (AAF) in the ratio of 90:5:5.[11]

Pharmacognostic studies

Morphological characters were studied by observing the stem and root as such and also with the help of the dissecting microscope. Free hand thin transverse sections of Root and stem were taken for detailed microscopical observation. Sections were observed as such for the presence of any crystals, then were stained with Phloroglucinol and Hydrochloric acid (HCl) to notice the lignified elements and other parts.[12] Canon digital camera attached to Zeiss microscope was used to take microphotographs of the sections of stem and root. Powder characters were studied according to the guidelines Ayurvedic Pharmacopoeia of India.[13] The histo-chemical tests were carried out as per the standard guidelines.[14]

RESULTS AND DISCUSSION

Stem

Macroscopy

Stem cylindrical, branched, soft, hairy and slightly curved when young, Purplish- brown, greenish when young brown to black after drying, internodes present, lenticels absent.

Microscopy

Transverse section of stem showed an outer epidermis, middle cortex, vascular bundles and centrally located large pith. (Plate: B-1)

The detailed structure shows the outer most single layered epidermis consisting of barrel shaped compactly arranged epidermal cells and in some places interrupted by unicellular warty trichomes. Beneath the epidermis 2-3 layers of chollenchymatous tissue forming hypodermis consisting thick compactly arranged chollenchyma cells without any air spaces.

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PLATE-A

1. Natural habitat of *R. Hypocrateriformis*

2. Root Powder of *R. Hypocrateriformis*

3. Stem powder of *R. hypocrateriformis*

Cortex very much reduced, composed of parenchyma cells heavily deposited by tannin material, rosette crystals of calcium oxalate and some simple and compound starch grains. 2-3 layered pericyclic fibers circularly arranged beneath the cortex and are thick walled occasionally interrupted with stone cells. (Plate: B-2,3,4)

Vascular bundles radially arranged and bicollateral. Meta-xylem solitary, present at top of the bundle along with its parenchyma and fibers, protoxylem towords the pith. Many vessels radially arranged towards the inner side separated by uniserriate medullary rays. Medullary rays filled with tannin material and starch grains. Phloem present on both side of the xylem consist phloem fibers and sieve elements (Bicollatral). (Plate B-6)

Pith occupies 1/3rd of the portion made up of lignified pitted parenchyma. Some parenchyma cells are loaded by simple and compound starch grains along with some rosette crystals of calcium oxalate. (Plate B-5)

Powder microscopy

Organoleptic characters of the stem shows light yellowish green colour, woody odour, taste astringent and slightly bitter. (Plate A-3)

Diagnostic characters of stem powder shows unicellular warty trichomes that measures about 78 µm x 10 µm. Rosette crystals of calcium oxalate measures 9 µm in diameter.

The tannin containing parenchyma cells were also observed. Simple and compound starch grains with concentric lines were seen. The fibers are septate and lignified measuring about 80 µm x 1.3 µm and some were with wide lumen. Fragments of annular vessels that measures about 20 µm x 4 µm as well as border pitted vessels were also noted during the study. (Plate B-7-12)

Root

Macroscopy

Root cylindrical, tapering, elongated, branched having thin rootlets colour (outer) dark brownish yellow, size 3- 5 cm long, surface yellowish to dark brown, fibres strong, fissure longitudinal, node – inter node and lenticels absent

Microscopy

Transverse section of root showed an outer cork, middle cortex, centrally located vascular bundles devote of pith. (Plate C-1)

Detailed section showed cork the outer most layer consisting of 6-7 layers of tangentially elongated barrel shaped cells with brownish colouring matter. Beneath the cork a reduced cortex zone of 6-7 layers of parenchyma cells consisting of oil globules, rosette crystals of calcium oxalate and yellowish brown (tannin) and large laticiferous cells.

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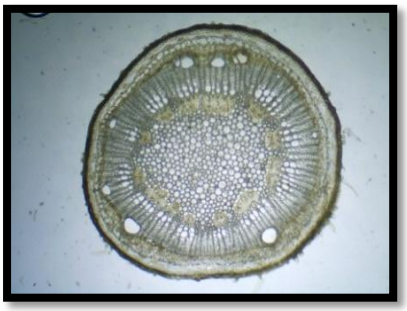
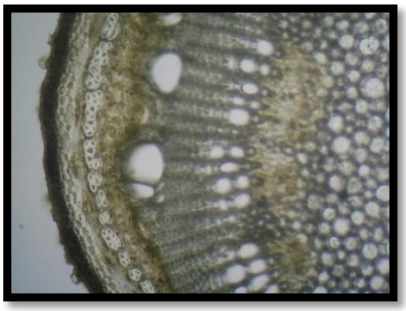
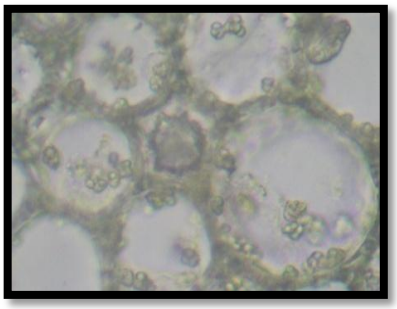
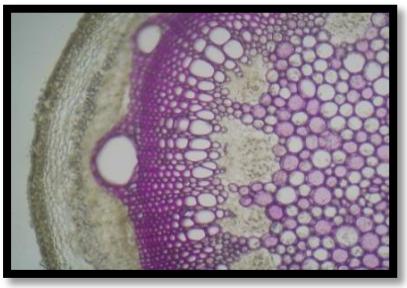
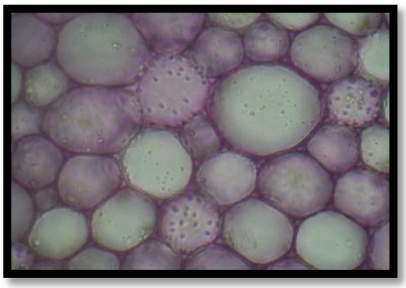
PLATE-B (Stem)

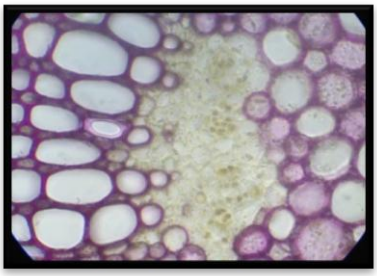

1.T.S. of stem (unstained) Diagramatic

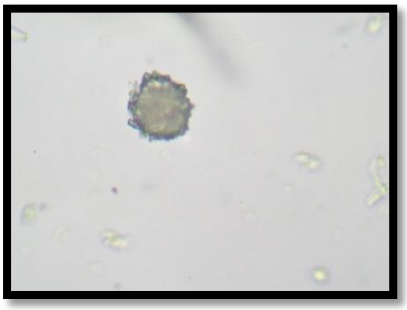

2.T.S.of stem-Epidermis, Cortex,Vascular bundle


3.Rosette crystal of stem

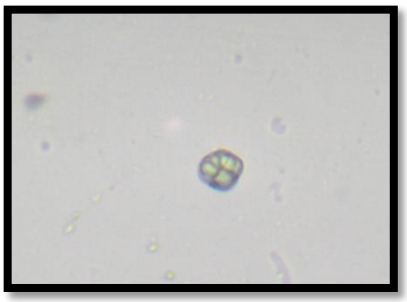

4.T.S.of stem- Lignified elements


5.Lignified pitted parenchyma of Pith

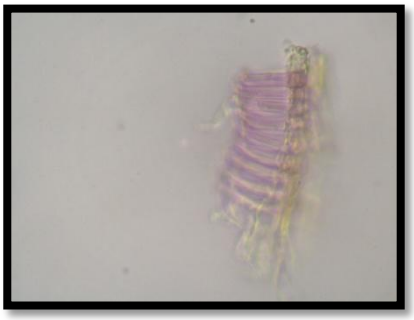

6.Xylem, Pholem


7.Rosette crystal


8.Unicellular warty trichomes


9.Compound starch grains


10. Lignified fibres


11. Fragments of annular vessels


12. Border pitted vessels

Table 1: Histo – chemical test of stem and root of *Rivea hypocrateriformis*

Sr. no	Reagent	Observation	Characteristics	Results	
				Stem	Root
1.	Phloroglucinol+Conc. HCl	Red	Lignified cells	++	++
2.	Iodine	Blue	Starch grains	+	++
3.	Phloroglucinol+Conc. HCl	Dissolved	Calcium oxalate crystals	++	++
4.	$Fecl_3$ solution	Dark blue to black	Tannin cells	++	++
5.	Ruthenium	Red	Mucilage	++	--

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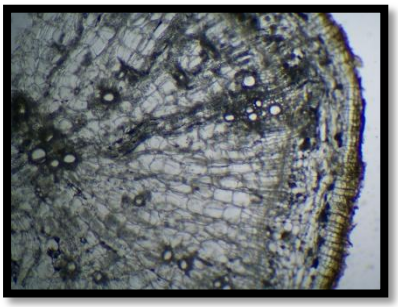
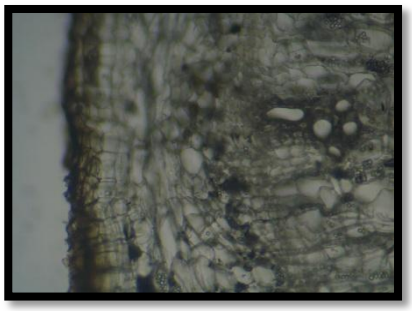
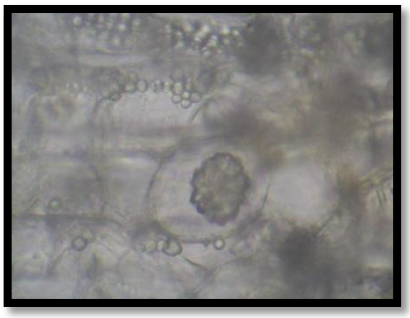
PLATE – C (Root)



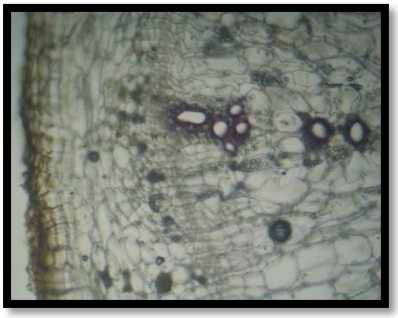
1. T.S.of root-Cork,cortex,Vascular bundle.



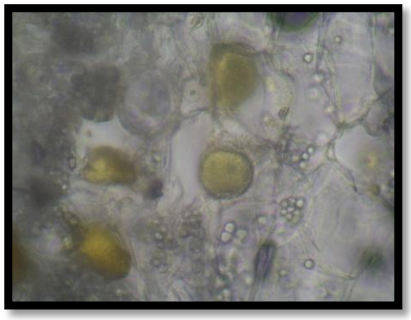
2. T.S.of root-Cork,cortex,Vascular bundle.



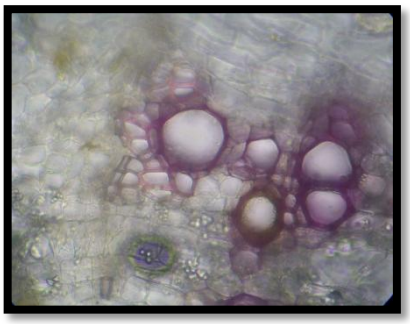
3. Rosette crystal along with starch grains



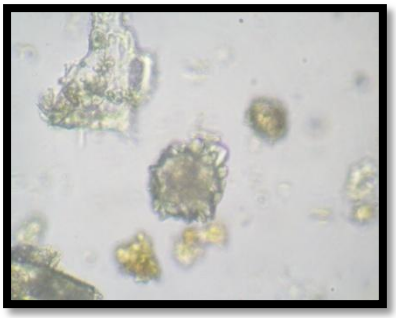
4. T.S.of root-showing Xylem and phloem



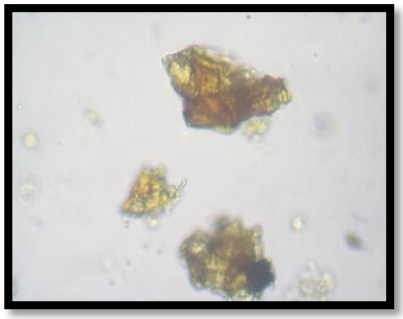
5. Laticiferous cells



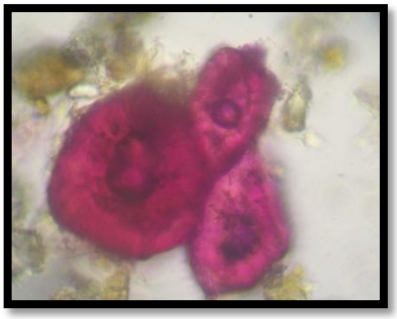
6. Xylem and Phloem



7. Rosette crystal

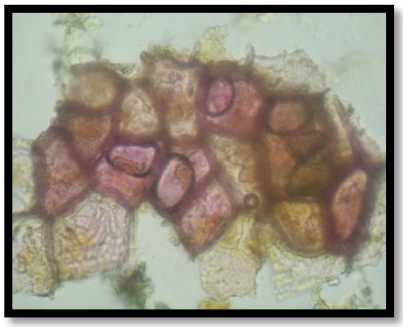


8. Tannin content



9. Pitted stone cells

10. Lignified fibres



11. Lignified cork

12. Border pitted vessels

Cortex made up of cortical parenchyma filled with simple and compound starch grains. Endodermis is single layered followed by phloem region. Beneath the phloem, xylem is arranged radially consisting xylem parenchyma and fibers. (Plate C-2) Xylem reaches upto the central most part of the root without any pith. Medullary rays uniserriate to multiserriate somewhat elongated. The medullary rays heavily deposited with oil globules and latex. parenchyma cells starting from the centre are reaching upto cortical zone. Here and there some of rosette crystals of calcium oxalate were also seen. some medullary ray cells are filled with simple and compound starch grains. (Plate C-3,4,5,6)

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Powder microscopy

Organoleptic character of root powder of *Rivea hypocrateriformis* shows light creamish brown colour with characteristic odour, bitter to astringent taste, coarse in touch. (Plate A-2) Diagnostic character of root powder showed rosette crystals of calcium oxalate, tannin content, and lignified fibers with wide lumen. Simple and compound starch grains were present. Pitted stone cells were also seen. Sclerides measured 25 x10 µm. Some vessels were borderly pitted. Lignified cork was seen. (Plate C-7-12)

CONCLUSION

R. hypocrateriformis root and stem showed the presence of common characters like rosette crystals of calcium oxalate, tannin content, simple and compound starch grains. *R. hypocrateriformis* stem possessed unicellular warty trichomes (78 µm x 10 µm), Rosette crystals of calcium oxalate (9 µm in diameter), mucilaginous material, septate and lignified fibers. Medullary rays and parenchyma filled with tannin material. *R. hypocrateriformis* root showed rosette crystals of calcium oxalate, tannin content, lignified fibers with wide lumen. Simple and compound starch grains, Pitted stone cells, Lignified cork, oil globules. Observed identified characters of the stem and root of *R. hypocrateriformis* may be useful to establish the botanical standards for identification and standardization of the plant drug and also for further research works.

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