



MORPHO ANATOMICAL STUDIES OF *ARISTOLOCHIA ROTUNDA* L. – A POTENT MEDICINAL PLANT

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ABSTRACT

Aristolochia rotunda L belonging to the family Aristolochiaceae is a herbaceous perennial native to Southern Europe. It is commonly known as smearwort or round-leaved birthwort. In traditional system of medicine it serves as an ideal choice in the treatment of hepatitis, splenitis, bronchial asthma, pleurisy, amenorrhea, arthritis, sciatica etc. Owing to its medicinal potential present paper deals with the morpho- anatomical studies of *Aristolochia rotunda* L so as to evaluate its micro-structural characteristics. The study illustrates a set of diagnostic characters that can be considered as an initial step in ensuring its identity and authenticity before exploring its therapeutic claim under the herbal quality control protocol.

KEY WORDS: *Aristolochia rotunda* L., Medicinal potential, morpho-anatomical studies.

INTRODUCTION

Aristolochia rotunda L. which is commonly known as smearwort or round-leaved birthwort^[1-3] is a perennial herb belonging to the family Aristolochiaceae.^[4-6] This medicinal plant is generally found in the Mediterranean regions, Central Asia, South Europe, Iran, Iraq, Northern Morocco, Spain, Turkey and Portugal. It grows predominantly along the banks of canals, edges of ditches and fields, sides of roads, meadows, slopes and forests preferably in chalky soils and moist, shady areas, at an altitude of 0-800 meters above the sea level.^[2, 7]

The name of the genus 'Aristolochia' originates from two Greek words 'aristos' and 'lochia' which means 'the best' and 'child birth', respectively on the basis of its folklore use as a uterine stimulant.^[8-10] The Latin name of the species *rotunda* refers to the rounded shape of the leaves. The root of the plant is about 5-25 cm long, hard, horny, and tuberous. In reference to the colour of roots this plant is also known as Zarawand Mudahraj in Arabic, Persian, Hindi and Italian languages.^[1, 11-14] As the outer surface is yellow or golden brown and the inner surface is reddish in colour it is called Zarawand which means golden utensil in Persian and Mudahraj means round which refers to the shape of the roots.^[14] The upper surface of the root contains remains of several small pits which represent the origin of stems while the inner surface shows one central scar marking pointed the

origin of rootlets. Stems arising from the root are unbranched, slender and almost sessile. Leaves are obtusely heart shaped, stalk less, alternate, smooth edged and clasping the stem. The flowers are solitary, approx. 2.5-5 cm long, tubular with an outer yellow and inner orange surface. Flowering generally occurs during April-June.^[15]

In traditional system of medicine *Aristolochia rotunda* L. is used as a tonic, diuretic, vermifuge, emmenagogue, stomachic, stimulant and cephalic. It is prescribed in the treatment of gout, hepatitis, worm infestations, leprosy, itching, bronchial asthma, pleurisy, amenorrhea, arthritis and sciatica etc.^[16-18] Owing to its therapeutic potential; present study has been undertaken with an objective to establish the morpho - anatomical characters of *Aristolochia rotunda* L. so that authentic plant material could be explored for its therapeutic claim. A set of diagnostic characters illustrated in the study can be considered as a first step towards ensuring the identity of the drug sample under the herbal quality control protocol.

MATERIAL AND METHODS

Plant Material

The drug material (tubers) was purchased from the local market, new delhi. After proper identification and authentication the voucher specimen was preserved in

the botany section of the lab (DSRU, New Delhi) for future reference.

Morpho – Anatomical Studies

Tubers were taken for morphological and anatomical studies. Various organoleptic and morphological characters like colour, shape, size, odour and taste etc. were studied. For anatomical studies free hand transverse section were prepared using a razor blade and stained as per standard and well established methods.^[19,20] The dried tubers were powdered and sieved through 40 mesh. The powdered drug first cleared in the solution of chloral hydrate and then mounted in solution of chloral hydrate and glycerol to prevent the formation of chloral hydrate crystals during the examination of the slide. Several preparations with different mountants like iodine water, sudan III, ruthenium red, ferric chloride etc. were also made to emphasise the presence of particularly important cells or cell contents. Care should be taken to avoid the presence of any air bubble^[21,22] Most diagnostic features and the dimensions of the cells and other particles were recorded. Photomicrography was performed by using digital microscope with computer attachment. The powder and its behaviour on treatment with different chemical reagents were studied (Table I). Fluorescence characters of the powdered drug was observed under U.V.^[23] and the results were shown in Table II.

RESULT

Taxonomic Classification^[8]

Kingdom : Plantae
Sub Kingdom : Tracheophyta
Phylum : Spermatophyta
Class : Dicotyledonae
Order : Piperales
Family : Aristolochiaceae
Genus : Aristolochia
Species : *Aristolochia rotunda* L.

Morphological Studies

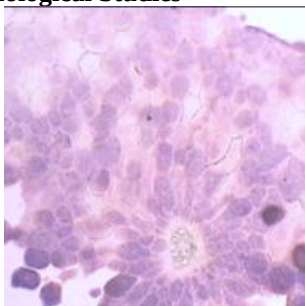


Fig. 1

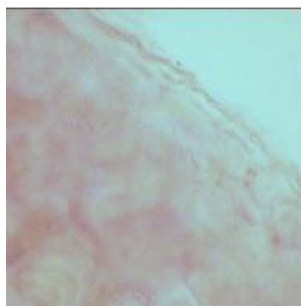


Fig. 2

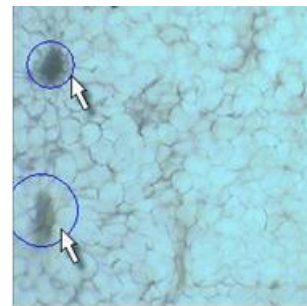


FIG. 3

Fig. 1: x10 T. S. of tuber; Fig. 2: x40 T. S. of tuber (enlarged view); Fig. 3: x 10 T.S. of tuber showing scattered vascular bundles.

Microscopical Studies of the Powdered Drug

Colour : Light brown with orange-brown coarse particles dispersed in between
Odour : Spicy
Taste : Not definite

On examination under the microscope it shows following characters:-

Round, flattened disc like tubers which are hard, smooth, yellowish brown, surface marked with thin, light stripes all around, a centrally located pit is present on both (upper and lower) surfaces, odour spicy with no definite taste. (Fig. A)



Fig. A: *Aristolochia rotunda* L.

Anatomical Studies

Cross section of tubers shows the features of a monocot stem i.e. a wide zone of ground tissue in which a number of vascular strands are scattered irregularly. In T.S. it shows an outermost layer of epidermis having deposition at places on the outer surface. Epidermal layer is followed by 2-3 rows of rectangular, comparatively smaller parenchyma cells followed by a broad zone, occupying the whole area upto the centre, of ground tissue which are compact, round to polygonal, moderately thick walled parenchyma cells filled with granular starch grains. Numerous vascular bundles, consisting of few vessels only, are scattered irregularly in the ground region. The cells surrounding the vascular areas are compact, smaller in size and elongated forming a ring or sheath of radiating cells around the vascular areas. Needles of calcium oxalate are present in the ground tissue.

- Numerous parenchyma cells filled with granular starch grains.
- Pieces of vessels with spiral and scalariform thickenings.
- Needles of calcium oxalate crystals.

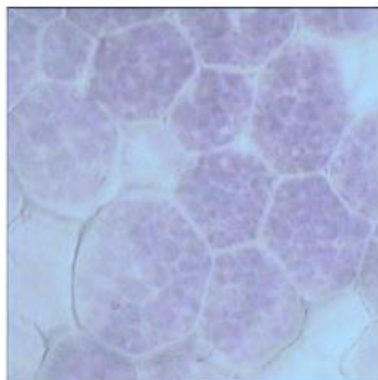


Fig. 4

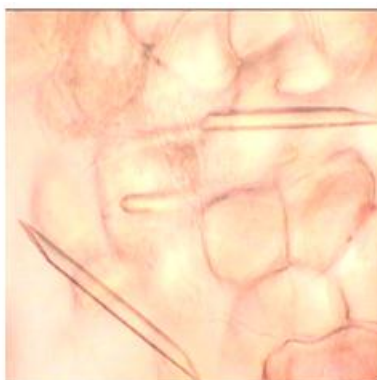


Fig.5

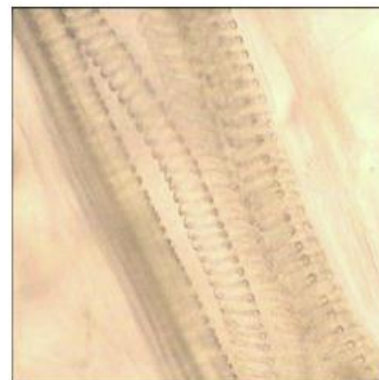


Fig. 6

Fig. 4: x40 Parenchyma cells filled with starch grains; Fig. 5: x40 Parenchyma cells showing needles of calcium oxalate crystals.; Fig. 6: Pieces of vessels in powder.

Table: 1 Acid/Chemical Reagent Reaction With Powder.

S.No.	ACID/CHEMICAL REAGENT	OBSERVATION
1.	Conc. Sulphuric Acid	Black
2.	Conc. Hydrochloric Acid	Dark Brown
3.	Conc. Nitric Acid	Orange
4.	Glacial Acetic Acid	No change
5.	Picric Acid	No change
6.	Iodine Solution	Greenish blue
7.	Ferric chloride Solution (aq.)	Bluish green
8.	Sodium hydroxide Solution (5%)	Coffee brown & reaction with fumes
9.	Potassium hydroxide Solution (5%)	Coffee brown & reaction with fumes
10.	Powder as such	Light Brown

Table: 2 Fluorescence Analysis.

S.No.	Reagent	Colour in Day-Light	Observation under U.V.Light		
			Modifying Colour	Quality of colour	Degree of radiance
1	Mounted in Nitro-Cellulose	Yellowish brown	Oily yellow	Dark	Bright
2	1N Sodium hydroxide in methanol	Coffee brown	Fluorescent green	Dark	Bright
3	Treated with 1N Sodium hydroxide in methanol&mounted in Nitro-Cellulose	Coffee brown	Fluorescent green	Dark	Bright
4	1N Hydrochloric Acid	Coffee brown	Oily yellow	Dark	Bright
5	Treated with 1N Hydrochloric Acid & Mounted in Nitro-Cellulose	Chocolate brown	Yellowish brown	Dark	Bright
6	1N Sodium hydroxide in Water	Coffee brown	Fluorescent green	Dark	Bright
7	Treated with 1N Sodium hydroxide in water&mounted in Nitro-Cellulose	Coffee brown	Fluorescent green	Dark	Bright
8	Dilute Nitric Acid (1:1)	Orange	Oily yellow	Dark	Bright
9	Dilute Sulphuric Acid (1:1)	Coffee brown	Fluorescent green	Light	Bright
10	Powder as such	Light brown	Coffee brown	Dark	Bright

CONCLUSION

Identification of the raw herbal material is an imperative prerequisite prior to exploring its therapeutic claim under the herbal quality control protocol. Morpho - anatomical studies of the crude herbal drugs is an integral component for establishing its botanical identity and ascertaining its quality. Hence, the diagnostic characters illustrated in the present investigation can be considered as a first step in ensuring the identity and degree of purity in the marketed sample of the drug.

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