PHARMACOGNOSTIC STUDY OF *Abutilon indicum* (L.) Sweet

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ABSTRACT:

Abutilon indicum (L.) Sweet is erect much branched, woody, under shrub of family Malvaceae, commonly called Shikka. The leaves of this plant is used by Andh, Gond, Naikede, Pradhan and Kolam tribes of Mahur range forest of Nanded district to treat bronchitis, diarrhea, inflammation of the bladder, chronic inflammation of urethra and urinary bladder. Pharmacognostic studies of leaves drug is carried out for evaluation of drug and to detect the adulteration. It includes dermal characters like stomata, trichomes and anatomical features etc. The plant was analyzed for its preliminary screening of phytochemicals. The result reveals that the presence of bioactive constituents comprising flavonoids, tannins and saponins.

Keywards: *Abutilon indicum (L.) Sweet , pharmacognostic studies, Mahur forest.*

INTRODUCTION

Abutilon indicum (L.) Sweet is much branched, woody, erect, under shrubs, hoary tomentose. It grows up to 1 to 2.5 meters high. Flowers are solitary, axillary; peduncles 3.5 to 5 cm long. Sepal five united; lobes ovate. Petals are five yellow, obovate, toothed at apex. (Fig. 5).

The plants are distributed in all parts of Marathwada and abundantly occur in Mahur range forest, cultivated field, grassland and wasteland.

The plant is used in folk medicine by the rustics and tribal people of Mahur range forest for the treatment of bronchitis, diarrhea, inflammation of the bladder, chronic inflammation of urethra and urinary bladder etc. The leaves possesses medicinal properties that are used to treat rheumatism, urinary tract infection and kidney stone, dental problems, toothache, piles, tuberculosis and stomachache and other elements (Rahmatullah *et al.*, 2009; Pradeep Kumanr 2014; Prachi *et al.*, 2009 and Immanuel and Elizabeth, 2009).; Alagesaboopathi (2009). Therefore, the preliminary phytochemical investigation is necessary to prove proclaimed ethnomedicinal uses.

MATERIAL AND METHODS

a)Plant material:

The leaves of *Abutilon indicum* (L.) Sweet were collected from Mahur range forest of Nanded district, Maharashtra. The collected plant material was taxonomically identified by using standard floras Naik (1979), Naik *et al* (1998), Chetty *et al.* (2008)., Yadav and Sirdesai (2002). The voucher specimen of plant was preserved in Department of Botany, Dnyanopasak College, Parbhani. Leaves were shade dried and powdered. The leaf powder was successively extracted with different solvent. The fresh leaves and stem were used for the study of macroscopic and microscopic characters.

b) Preliminary phytochemical Screening:

The leaf extract of *Abutilon indicum* (L.) Sweet in methanol solvents were undertaken by using standard methods for the detection of secondary phytoconstituents like alkaloids, glycosides, flavonoids, tannins, saponins, terpenoids phlobatannins , anthraquinones, reducing sugar and cardiac glycosides (Harborne, 1984).

c) Preparation of extract:

Leaves powder was subjected to soxhlet extraction with Methanol (64.5-65.5^{0}c) solvents (Daniel, 1991). The extracted solvent is evaporated to make the final volume one fourth of its original volume. The extract is stored at 4^{0}c in airtight bottles for further study.

Pharmacognostic studies:

Macroscopic study:

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Morphological studies were done using simple microscope. The shape, apex, base, margin, taste and odour of leaves powder were observed.

Microscopic studies:

The free hand transactions of leaves and stem were taken and stained by using double stained differential staining technique and mounted in DPX (Johanson, 1940). The cellular and anatomical illustrations were prepared by using camera lucida and some photographs were taken with the help of digital camera.

The leaf is peeled off for the study of stomata and the trichomes of upper and lower epidermis. For the study of vessels the stem is macerated by using Jeffery's fluid and stained with aqueous 1% saffranin and mounted in glycerine and made semi- permanent by ringing with DPX mountant.

The leaves powder was treated with phloroglucinol and HCl for the detection of lignin. Glycerin and iodine solution were used to determine calcium oxalate crystal and starch grains respectively. As a part of quantitative microscopy, stomatal number, stomatal index, vein islet number and vein termination number were determined by using fresh leaves of the plant (Kokate, 1997).

OBSERVATIONS

T. S. of Stem:

The transverse section of the stem is circular in outline. Epidermis is single layered composed of compactly arranged barrel-shaped parenchyma cells, which are highly cuticularised. Epidermis covered with uniseriate multicellular hairs. Beneath the epidermis collenchymatous hypodermis is followed by many layered loosely arranged parenchymatous cortex. Numerous conjoint, collateral open vascular bundles are present inner to the cortex and are arranged in a ring. Phloem is facing towards periphery. Xylem is endarch and is separated by medullary rays which are radially elongated compactly arranged parenchyma cells. At center, pith is made up of polygonal parenchyma cells without intercellular spaces (Fig No. 1).

T. S. of Leaf:

It is typical dicot leaf. Leaf anatomy shows upper and lower epidermis composed of rectangular compactly arranged cells. Both the surfaces covered with cuticle and hairs. The mesophyll is differentiated into palisade tissue and spongy parenchyma. Palisade tissue composed of two layers of closely arranged columnar cells they are present just below the upper epidermis. Just below the palisade tissue there are loosely arranged parenchymatous cells with intercellular spaces. Vascular bundle is conjoint, collateral and closed. Xylem is present towards the upper epidermis and the phloem towards the lower epidermis (Fig No. 2).

Stomata:

The leaf is simple rough, leaf lamina entire unicostate reticulate pattern of venation, the leaf is amphistomatic. The stomaties of both the surfaces are anomocytic, the guard cells are surrounded by five to six subsidiaries, which are morphologically corelated with epidermal cell (Fig 4).

Trichome:

The trichomes are present on both the adaxial and abaxial leaf surfaces. The trichomes are tufted or stellate with 9 or many arms and spread roughly parallel to the leaf surface. The arms arising from a common foot which is without protoplasmic content and spread roughly parallel to the leaf surface (Fig 3).

Vessels:

The vessel elements of secondary xylem show variation where 33% vessels are with spiral to scalriform thickening. Both end wall plates are oblique and multiperforate having size 80 mμ and diameter is 270 mμ lengths (Fig No. 6 C). About 33% vessels, the one end wall plate is transverse or oblique with simple perforation plates and other end wall is oblique with simple perforation plate. Lateral wall thickenings are spiral, the length is 380 mμ and diameter is 60 mμ. Remaining 33% vessels are short, lateral wall thickening is scalariform. One end wall is transverse with multiperforation plate while other end wall with oblique multiperforation plate, length is 230 mμ and diameter is 110 mμ (Fig No.6 A and B).

Phytochemical screening:

The Phytochemical screening of methanol leaf extracts of *Abutilon indicum* (L.) contain flavonoids, tannins and saponins. Whereas the alkaloids, glycosides, terpenoids, phlobatannins, anthraquinones, reducing sugar and cardiac glycosides were not detected (Table No.1).

Powder analysis:

The powder was characterized by its morphological features like green colour presence of specific odour and astringent taste. Microscopic study of powder reveals the presence of trichome, calcium oxalate crystal, xylem vessels and epidermal cells(Table No 2 and 3).

DISCUSSION AND CONCLUSION

The present study reveals that the extracts of leaves powder of *Abutilon indicum* (L.) contain flavonoids, tannins and saponins. These active agents could be promissory sources for drug development and thus validates the tribal folkloric claims. This assertion is also confirmed by pharmaceutical and antimicrobial studies, which could helpful in authentication of folkloric efficacy of the drug.

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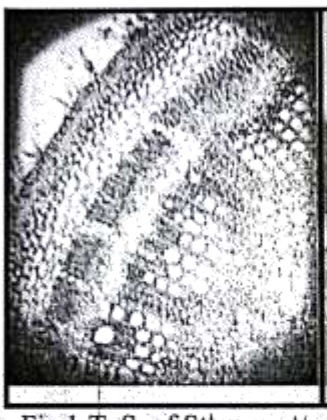


Fig.1 T. S. of Stem

Fig. 2 T. S. of Leaf

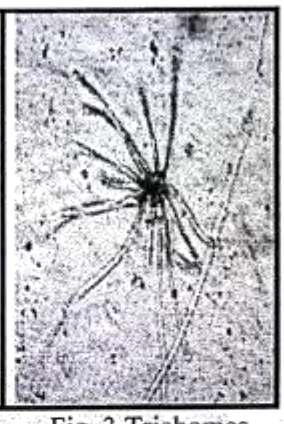
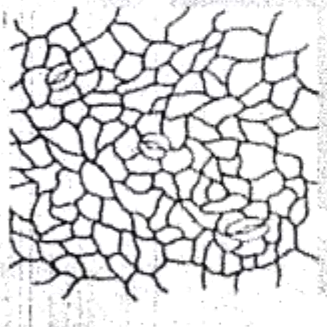


Fig. 3 Trichomes



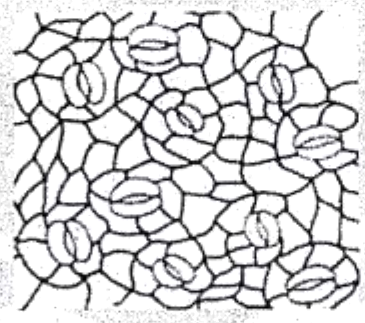
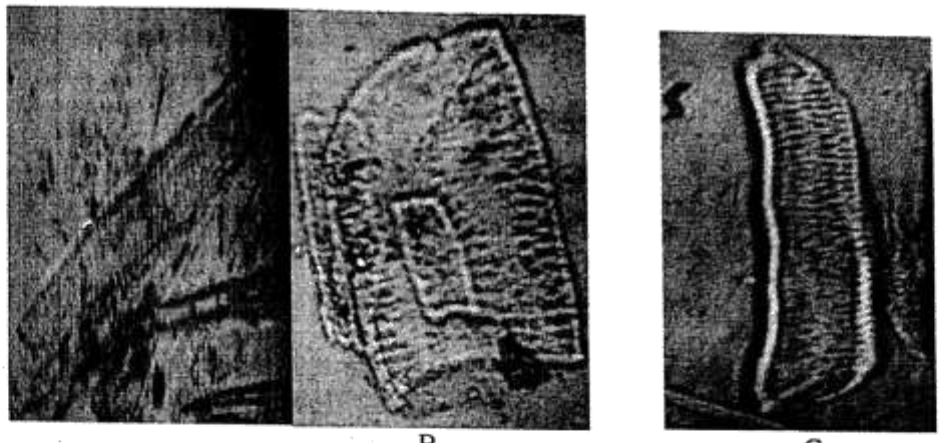


Fig. 4 A: Stomata upper epidermis B: lower epidermis

Fig. 5 *A. indicum*



A B C

Fig.6 Stem Vessels

Sr.no	Phytochemicals	Test	sr. no	Phytochemicals	Test
1	Alkaloid	-	6	Phlobatannins	-
2	Glycoside	-	7	Saponins	+
3	Flavonoids	+	8	Terpenoids	-
4	Tannins	+	9	Anthraquinones	-
5	Reducing sugar	-	10	Cardiacglycosides	-

Table No 1: Preliminary phytochemical screening of leaves powder

Sr No	Test	Observation	Inference
1	Colour	Green	Leaf drug
2	Odour	Specific	Aromatic crude drug
3	Taste	Astringent	Drug contain tannins

Table No. 2 : Macropscopic study of the drug

Sr No.	Reagent	Observation	Characteristic
1	Powder +Phloroglucinol+conc. HCl	Red or pink colour	Lignified cells of vascular bur
2	Powder +Ruthenium red	Pink colour	Mucilagenous cell of epidermis
3	Powder +Sudan red III	Pink colour	Cuticle
4	Powder +Acetic acid	Insoluble	Calcium oxalate crystal
5	Powder +Dil. Hydrochloric acid	Soluble	Calcium oxalate crystal
6	Powder +Conc.Sulphuric acid.	Green colour	Stone cell presnet
7	Powder +Dil. Iodine sloution	Blue	Starch in endodermis
8	Powder +Dil. Iodine solution +Conc. Sulphuric acid	Black colour	Hemicellulose absent

Table No 3: Flurosence analysis of the powdered leaf of *Abutilon indicum*

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Research Article

Pharmacognostic study of *Helicteres isora* L.

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ABSTRACT

Objective: *Helicteres isora* L. is erect woody branched shrub of family Sterculaceae, commonly called Murud sheng. Pharmacognostic study includes dermal characters like stomata, trichomes, anatomical features, macerated vessels and differential phytochemical test have been carried out for the authentication of the samples.

Methods: The fruit of *Helicteres isora* was collected from Mahur range forest of Nanded district, Maharashtra. The fruits were dried in shade and powdered. The fruit powder was extracted with in distilled water. For macroscopic and microscopic study of fresh leaves were selected. Leaf epidermal studies were carried out on fresh specimens. Transection of leaf, petiole, stem were taken by free hand. Fresh and preserved materials used.

Results: The preliminary screening of phytochemicals of present study reveals that the presence of bioactive constituents alkaloids, glycosides, flavonoids, tannins, cardiac glycosides, anthraquinones and saponins. These secondary metabolites help to cure dysentery, abdominal pain, diarrhoea and pharmacology assay is useful for the evaluation of drug and to detect the adulteration.

Conclusions: Biological actions are primarily due to these secondary metabolic components in a complex form concern with synergistic or antagonistic activities.

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Keywords: *Helicteres isora*, pharmacognostic studies, Mahur forest, phytochemicals

Introduction

Geographically Mahur is situated between 77° 5 -78° 5`East longitude and 17° 5`-20° 5` North latitude. The *Helicteres isora* L. is distributed in all district of Marathwada predominantly it is found in slopes of Mahur forest ranges. It is commonly called Murud sheng. It is used in the folk medicine by the rustics and tribals of Mahur range forest to treat gastro-intestinal complaints, dysentery, tympanitis, abdominal pain, diarrhoea and emphysema. Pharmacological and pharmacognostical studies of earlier researcher prove its medicinal efficacy.[1-3]

It is an erect woody branched shrub, branches are spreading and young parts are covered by stellate hairs, 1 to 2.5 m tall. Leaves simple, alternate, bifarious subsessile, broadly ovate-

oblong margin serrate pubescent on both the surface, often lobed. Flower in axillary few flowered cymes, pedicel very short with stellate tomentose, calyx tubular green two lobed, stellate pubescent outside, lobes triangular, unequal. Petals green, turning bluish or black very unequal, androecium consists of 10 stamens, staminal column fused with gynophore. Ovary is curved and present on 2-3 cm long gynophore; follicles are 4-6 cm long linear, twisted together, with stellate tomentose hairs. Seeds are numerous angular black. Flowering occurs during September to January and fruiting occurs during October to February. Leaves, fruit and root is used in ayurvedic medicine.

Materials and Methods

Plant material

The fruit of *Helicteres isora* L. was collected from Mahur range forest of Nanded district, Maharashtra. The collected plant material was taxonomically identified by using floras.[4-6] The fruits were dried in shade and powdered. The fruit powder was extracted with in distilled water. For macroscopic and microscopic study of fresh leaves were selected.

Preliminary phytochemical screening

Fruit powder was subjected to Soxhlet extraction with distilled water for 3-4 h and it is evaporated to make the final volume one fourth of its original volume. The extract is stored at 4^0c in airtight bottles for further study.[7]

The distilled water fruit extract of *Helicteres isora* L. is used for the analysis secondary phytoconstituents like alkaloids, glycosides, flavonoids, tannins, saponins, terpenoids and cardiac glycosides.[8]

Pharmacognostic studies

a) Macroscopic study

Morphological studies include shape, apex, base, margin, taste and odour of fruit powder were observed.

b) Microscopic studies:

The free hand transactions of leaves and stem were taken and stained by using double stained differential staining technique and mounted in DPX.[9] The cellular and anatomical illustration was prepared by using camera lucida and some photograph was taken with the help of digital camera.

The leaf is peeling is used for the study of stomata and the trichomes of upper and lower epidermis. For the study of vessels the stem is macerated by using Jeffery's fluid and stained with aqueous 1% saffranin and mounted in glycerine and made semi-permanent by ringing with DPX mountant.

The fruit powder was treated with phloroglucinol and HCl for the detection of lignin. Glycerin and iodine solution were used to determine calcium oxalate crystal and starch grains respectively. As a part of quantitative microscopy, stomatal number, stomatal index, vein islet number and vein termination number were determined by using fresh leaves of the plant.[10]

Results and Discussion

T. S. of stem

The transverse section of the stem is wavy in outline. Epidermis is single layered composed of compactly arranged barrel shaped parenchyma cells which are highly cuticularised. Beneath the epidermis, collenchymatous hypodermis is present followed by multilayered loosely arranged parenchymatous cortex. Inner to cortex many conjoint, collateral and open vascular bundles are present in ring. Phloem is facing towards periphery and xylem is endarch and is separated by medullary rays. At the center pith is made up of polygonal parenchyma cells without intercellular spaces (Figure 1).

Stomata

The stomata are restricted to intercostal zone of the both the surfaces. The stomata are anomocytic on both surfaces, surrounded by 4 to 5 subsidiaries which are morphological

correlated with epidermal cells (Figure 4 A and B).

Trichome

The trichomes are present on both the adaxial and abaxial leaf surfaces. The trichomes are stellate with 6 to many arms, the arms spread roughly parallel to the leaf surface. The arms arising from a common foot some arms are with protoplasmic content and some without protoplasmic content. The trichomes of epidermis consists foot, stem and body. The foot is embedded in epidermal cells while the body composed of many cells, the terminal cell is pointed (Figure 2).

Figure 1: T. S. of stem.

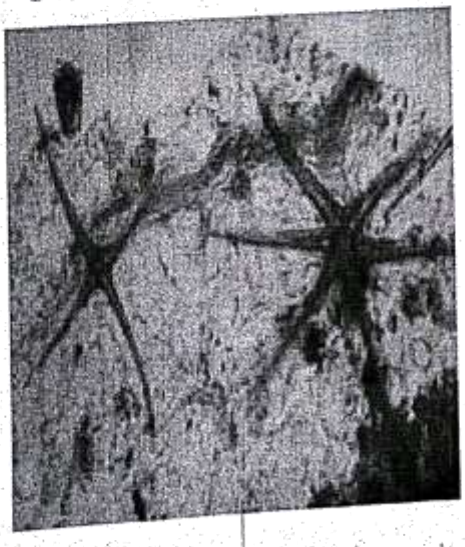

Figure 2: Trichomes.

Figure 3: *Helicteres isora* L.

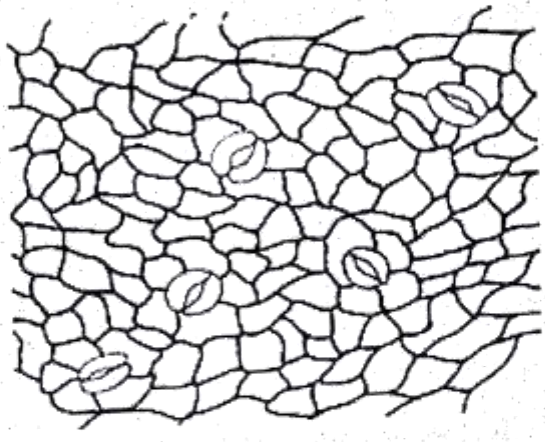

Figure 4 (A): Stomata upper epidermis.

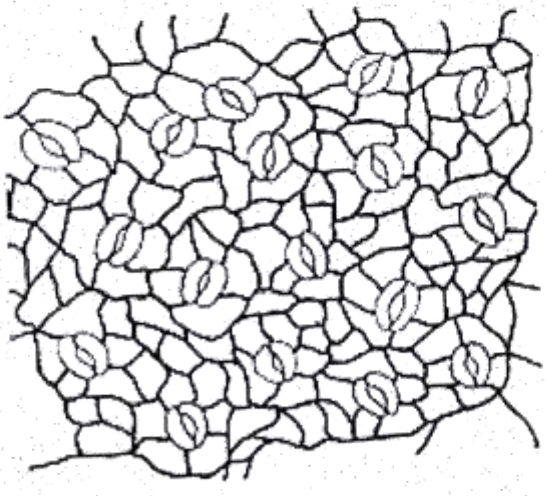

Figure 4 (B): lower epidermis.

Table 1: Preliminary phytochemical screening of fruit powder.

Sr.no	Phytochemicals	Test	Sr. no	Phytochemicals	Test
1	Alkaloid	+	6	Phlobatannins	-
2	Glycoside	+	7	Saponins	+
3	Flavonoids	+	8	Terpenoids	-
4	Tannins	+	9	Anthraquinones	+
5	Reducing sugar	-	10	Cardiacglycosides	+

Table 2: Macroscopic test.

Test	Observation	Inference
Colour	Blakish brown	*Pod of H. isora*
Odour	Characteristics	Aromatic crude drug
Taste	Astringent	Drug contain tannins

Table 3: Flurosence analysis of the powdered seed of *Helicteres isora* L.

Sr No.	Reagent	Observation	Characteristic
1	Powder +Phloroglucinol+conc. HCL	Pink	Lignified sclerenchyma
2	Powder +Ruthenium red	Red colour absent	Mucilage absent in epidermis
3	Powder +Sudan red III	Pink	Cuticle is absent
4	Powder +Acetic acid	Insoluble	Calcium oxalate crystal presnt
5	Powder +Dil. Hydrochloric acid	Soluble	Calcium oxalate crystal presnt
6	Powder +Conc.Sulphuric acid.	Balck colour	Stone cell absent
7	Powder +Dil. Iodine sloution	Blue colour	Starch is present
8	Powder +Dil. Iodine solution +Conc. Sulphuric acid	Black colour	Hemicellulose is absent

Vessels

The vessel elements of the secondary xylem show variation. Where 33% of the vessels are with sclariform thickenings both end wall plates oblique with tail and with monoperforation plate having size 60 mμ diameters and length is 380 mμ (Figure 5C). 33% of the vessels are with spiral or sclariform thickenings both end wall plates are oblique with monoperforation plate having size 80 mμ diameter and length is 370 mμ (Figure 5A and D). 33% of vessels are with pitted thickening, both the end wall plate is traverse with monoperforation having size 110 mμ diameter and length is 310 mμ (Figure 5).

Phytochemical constituents

The preliminary phytochemical analysis of seed powder shows the presence of alkaloids, glycosides, anthraquinones, tannins; saponins, flavonoids and cardiac glycosides. The terpenoides, reducing sugar and phlobatannins are absent (Table 1).

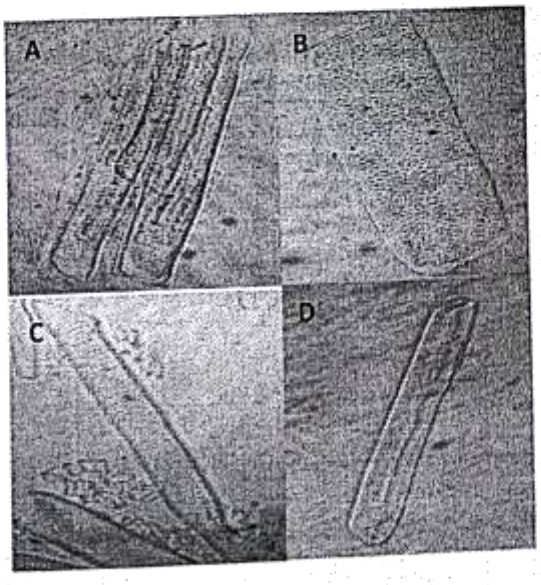

Figure 5 (A-D): Stem vessels.

Powder analysis

The powder was characterized by its morphological features like blackish brown colour, presence of specific characteristic and astringent taste. Microscopic study of powder reveals the presence of stellate trichome, endodermis, polygonal cells with oil globules and aleurone grains (Table 2 and 3).

Conclusion

The present study reveals that the fruit of *Helicteres isora* contains alkaloids, glycosides, anthraquinones, tannins, saponins, flavonoids and cardiac glycosides. This shows the generality of the components in medicinal plants. Biological actions are primarily due to these secondary metabolic components in a complex form concern with synergistic or antagonistic activities. The combinations of such phytochemicals show a broad spectrum of biological effects and pharmacological properties.[11] Further pharmacological and antimicrobial studies helps to evaluate the pharmaceutical effect of *Helicteres isora* fruit and authentication of its folkloric efficacy.

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