

A Description and Relevant Information Profile of the Medicinal Plant *Helicteres Isora* Linn

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<p>Abstract: The medicinal plant <i>Atmora</i> (<i>Helicteres isora</i> Linn.) is used to treat a variety of illnesses. The fruit of this plant is commonly referred to as Marodphali, Enthani, because of its screw-like appearance. <i>Atmora</i> is a traditional medicine used to treat new-born constipation, diarrhea, and snake bites. <i>H. isora</i> grows to a height of five to eight meters as a small tree or large shrub. Its ovate, hairy leaves with serrated margins are arranged alternately, and its bark is grey. Its fruits are green when raw, brown or grey when dried, and twisted, with a screw at the tip. Its flowers are brick red or orange-red. Antioxidants, carbohydrates, proteins, fiber, calcium, phosphorus, and iron are all rich in <i>H. isora</i>. This study aims to describe about botanical characteristics, uses, ethno-medicinal properties and therapeutic importance of it.</p> <p>Keywords: Pharmacological Activity, Medicine, <i>Atmora</i>, Malvaceae, <i>Helicteres isora</i>.</p>	<p align="center">Research Paper</p>
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1. BACKGROUND

Helicteres isora Linn. Is a significant medicinal plant with notable nutritional and therapeutic properties among the many native medicinal plants. This tropical shrub from Southeast Asia is grown all over India. The Indian System of Medicine (ISM) has traditionally used different parts of the plant to treat different types of illnesses. Moreover, findings from current studies indicate that *H. isora* was a rich source of bioactive substances with medicinal effects, including tannins, polyphenols, and alkaloids. In addition, *H. isora* is said to be an excellent source of iron, calcium, phosphorus, proteins, fiber, and carbohydrates. According to a number of studies, several antioxidant chemicals, including ascorbic acid, flavonoids, and phenolics like cucurbitacin B and iso-cucurbitacin B, are present. These findings are based on extraction and characterisation investigations (Lee *et al.*, 2010).

Additionally, it has been claimed that *Helicteres isora* extracts have anticancer, antimicrobial, and anti-diabetic properties. Given the extensive range of therapeutic applications for *H. isora*, it was thought necessary to provide a brief overview of current developments and future prospects for the therapeutic use of its bioactive fractions for the treatment of illnesses, including cancer. This study's primary goal is to provide an overview of the results of experimental investigations into the therapeutic applications of *H.*

isora extracts derived from various sources. Furthermore, an effort has been made to pinpoint current therapeutic activity.

2. METHOD

Data have been collected from different reputed international journals and literature.

3. DISCUSSION

This paper describes the botanical characteristics, appearance, and results of experiments on the medicinal applications of *H. isora* extracts from various sources. Additionally, an effort has been made to recognize terminology and information in various local areas.

4. The Plant Family: Malvaceae

The family of flowering plants known as Malvaceae, or the mallows, is thought to have 244 genera and 4225 species. Several well-known and economically significant members are durian, cotton, cocoa, and okra. There are also some genera containing familiar ornamentals, such as *Alcea* (hollyhock), *Lavatera* (Tree Mallow). The largest genera in terms of number of species include *Hibiscus* (300 species), *Sterculia* (250 species), *Dombeya* (250 species), *Pavonia* (200 species) and *Sida* (200 species) (Christenhusz *et al.*, 2016).

The plants with five petals on their blossoms and a nutlet-shaped fruit are grouped together in the Malvaceae, or mallow, family. *Malva sylvestris*, hairless cotton (*Gossypium herbaceum*), hollyhock (*Althaea rosea*), and marsh-mallow (*Althaea officinalis*) are a few examples (Everaldo *et al.*, 2005).

The plant known as common mallow, or *Malva sylvestris*, blooms from February to March and has pink to purple flowers. It grows in rocky and agricultural areas and is found in Europe, North Africa, and Asia. It was applied as an expectorant and to treat inflammation of the genitourinary tract. It has flavonoids, tannins, essential oil, and several vitamins. The analgesic, anti-inflammatory, and anti-ulcer effects are attributed to the flavonoids hypolaetin and gossypin.

Since the Phoenician era, hairless cotton (*Gossypium herbaceum*) has been grown and farmed. From July to September is when it flowers. Cotton was utilized for its therapeutic properties in addition to being used to make cotton wool, which was made from hairless cotton. Though extreme caution was exercised during pregnancy due to its abortifacient properties, the cotton, branches, and roots were utilized to support the uterine muscles during labor. Gossypol, an essential ingredient in the seed oil, possesses antifungal, antibacterial, and male contraceptive qualities.

One of those healing plants whose origins are unknown is hollyhock (*Alcea rosea*). From April to June, the plant blooms with pink to purple flowers. It was used to treat skin and intestinal inflammation as well as throat infections. The phenolic compounds found in the flowers are responsible for their expectorant and anti-inflammatory qualities. The flowers yield a dye that is used to color foods and medications (Everaldo *et al.*, 2005).

5. The Plant Genus: *Helicteres*

The genus *Helicteres* includes flowering plants that are part of the Malvaceae family. Asian region contains it, including the Malay Peninsula, Java, Saudi Arabia, South China, and the Indian subcontinent (Roskov *et al.*, 1999).

5.1 Species of *Helicteres* in Bangladesh

- *Helicteres isora*
- *Helicteres baruensis*
- *Helicteres ovata*
- *Helicteres versicolor*
- *Helicteres viscida*
- *Helicteres corylifolia*
- *Helicteres aspera*
- *Helicteres angustifolia*
- *Helicteres roxburghii*
- *Helicteres grewiaefolia*

5.2 The Investigated Plant: *Helicteres isora*

Helicteres isora Linn., sometimes called the Indian screw tree but in Bangladesh its common name is Atmora or Rajot, is a species of small tree or large shrub found in Asia including the Malay Peninsula, Java, South China, Indian Subcontinent, and Saudi Arabia. also located in Australia. Sunbirds are the primary pollinators of the red flowers. It has a remarkable array of therapeutic and nutritional benefits. Rope is made from the bark's fibers. Additionally, a large number of butterflies and hymenoptera frequent there (Reddi, *et al.*, 1999).

The tone of the flowers is orange-red. The plant grows all over India, from Jammu and South India to Bengal and Punjab. The shrub/tree typically grows up to 1500 meters on the hill slopes in dry deciduous forests in central and western India. The flora of Central and Western India is abundant in it. It can also be found on Australia's Malay Peninsula. On Java Island, it is called to as "Buah Kayu Ules or Ulet-Ulet" in Indonesia (Gupta *et al.*, 2009).

It should be mentioned that many plant components are good providers of nutrients and have profiles of significant antioxidants like tannins and polyphenols. The nutritional and therapeutic benefits of these antioxidants and nutrients are widely established (Singh *et al.*, 1985; Hossain *et al.*, 2023).

6. Taxonomic Hierarchy of *Helicteres isora*

Tab. 1

Kingdom:	Plantae
<i>Clade:</i>	Angiosperms
<i>Clade:</i>	Eudicots
<i>Clade:</i>	Rosids
Order:	Malvales
Family:	Malvaceae
Genus:	<i>Helicteres</i>
Species:	<i>H. isora</i>

7. Identification

Binomial Name

- *Helicteres isora*

Synonyms

- *Helicteres grewiaefolia* DC
- *Helicteres isora* var. *microphylla* Hassk
- *Helicteres isora* var. *tomentosa* Mast
- *Isora versicolor* Hassk
- *Ixora versicolor* Hassk

International Common Name

- Sanskrit - Avartani; avartphala
- Hindi - Marorphali (मरोड़ फली), bhendu, jonkphal

- English - Indian screw tree, East Indian screw tree, deer's horn
- Marathi - Kewad, muradsheng (मुरुड शेंग)
- Bengali - Atmora
- Gujarati - Maradashingh
- Kannada - Yedmuri
- Telugu - Vadampiri
- Malayalam - Idampiri valampiri
- Thai - สมุนไพรอะบิด, Samunpra pai ka bid
- Sinhala - Liniya (ලීනියා)

Common Name in Bangladesh

- Atmora
- Rajot

Local Name

- Atmora
- Rajot

8. Botanical Characteristics

Large shrub or small tree, growing to a height of 5 to 8 meters, with hairy, ovate-shaped leaves that are placed alternately and have serrated edges. The flowers have an orange-red or brick-red tint. The name "Indian Screw Tree" refers to the fruit, which are complex pods with a pointed end that are twisted like screws. Dried fruits take on a brown or gray hue, resembling green. The seeds have a dark brown color, are highly polished, and have a rhomboid, rectangular, or triangular form (Ramankutty *et al.*, 2012).

9. Distribution

It's a medium-sized tree or shrub from tropical Asia. The shrub/plant can be found in south India, Pakistan, Nepal, Myanmar, Thailand, Sri Lanka, and all of India's states from Punjab to Bengal. On the hill slopes

of central and western India, it grows gregariously in dry deciduous woods up to 1500 meters in elevation. It can also be found in Australia's Java, Malay Peninsula (Kirtikar *et al.*, 1995).

10. Ethnopharmacological Relevance

It is a good source of iron, calcium, phosphorus, fiber, proteins, and sugars and carbohydrates. The indigenous medical system traditionally uses different sections of the plant to treat different kinds of illnesses. The roots and bark are used to treat colic, scabies, gastropathy, diabetes, diarrhea, and dysentery. They are also demulcent, constipating, and lactifuge. The fruits have antispasmodic, vermifuge, appetizer, refrigerant, and astringent properties. They alleviate diarrhea, dysentery, flatulence, colic, and diarrheal illnesses. To treat a snake bite, topically administered root juice and fruits are used. Fruit pods have a lot of nutrients. To help with postpartum weakness, new moms are given fruit powder combined with additional herbs and spices in a delicious delicacy called laddoo (Trivedi PC *et al.*, 2002). This plant possess pharmacological activity with evidence like other medicinal plants (Hoque *et al.*, 2023; Majedul, 2023).

11. Medicinal Uses

It is a plentiful source of nutrients and antioxidants that have therapeutic value. The plant is said to possess antimicrobial, anticancer, anti-diabetic, and antioxidant qualities (Sivakumar *et al.*, 2002).

The seeds' essence heals stomach aches and diarrhea. Expectorant, demulcent, astringent, galactofuge, and a scabies cure are the properties of the root and stem bark. Dysentery and diarrhea are among conditions for which the stem bark is utilized.

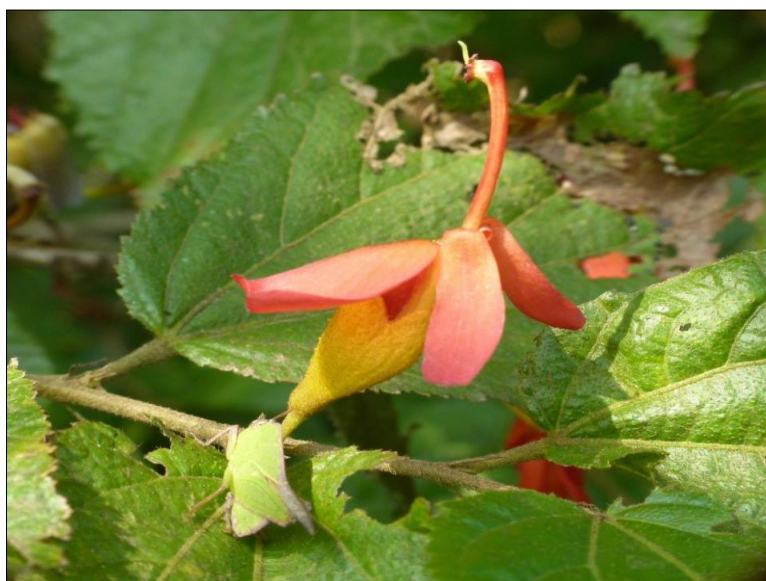


Figure 1: Flowers of *Helicteres isora* Linn



Figure 2: Stem and Bark of *Helicteres isora* Linn.

12. Ethno-Medicinal Properties of *Helicteres Isora*

When compared to a random approach, having prior knowledge about a plant's traditional medicinal use greatly increases the chance of discovering a herb or drug with notable therapeutic benefits. As a result, by speaking with locals and obtaining some secondary ethnomedical data, we tried to determine whether different plant parts had any local medicinal applications (Trivedi *et al.*, 2002).

Leaf paste is said to be beneficial for treating a number of skin conditions, including scabies and eczema. Fruit pod extracts have been shown to be vermifuge (colic) and anti-dysentetic. It is also used as an astringent and for gout, stomach aches, and flatulence. In order to relieve pain, fruits are fried in mustard oil and applied to the bodies of new-borns. To address postpartum health weakness, new moms are given fruit powder mixed with other herbs and spices as laddo, an Indian sweet dish (Chopra *et al.*, 1986).

According to reports, the root decoction/juice and paste have historically been used in ISM to treat asthma, diabetes, diarrhea, emphysema, and stomach ailments (Warrier *et al.*, 1994). It is also claimed to be used as expectorant, astringent, anti-galactagogue, to reduce gripping and a cure for snakebite (Chakrabarti *et al.*, 2002). The root and bark extract exhibits hypolipidemic action, insulin uptake sensitization, and prospective use in the management of type 2 diabetes (Kumar *et al.*, 2007).

13. Bioactive Compounds and Their Therapeutic Efficacy

Almost all medicinal plants in this world contain some chemical constituents that can be beneficial for animal, commonly investigated for their therapeutic evidence and documentation (Hoque *et al.*, 2023). Because of their unique physiological effects on the human body and the bioactive compounds they contain, medicinal plants and herbs have therapeutic value. In different sections of *H. isora*, preliminary qualitative investigations on a variety of extracts revealed the

presence of phenolics, flavonoids, glycosides, tannins, carotenoids, ascorbic acid, and saponins (Tambekar *et al.*, 2008); concentrations may vary according to season or part studied. Cucurbitacin, rose-marinic acid, gallic acid, and kaempferol are prominent antioxidants among the many bioactive components and antioxidants of *H. isora* that have been found. When separated from other herbs, they exhibit proven anticancer properties with the ability to scavenge free radicals (Fuhrman *et al.*, 2000). In addition, it was found that gallic acid is one of the antioxidant present in *H. isora*. Furthermore, the principal ingredients of *H. isora*'s chemical makeup in different plant parts, fulfill the requirements of a good antioxidant reservoir (Algerian, 2005).

14. Experimental Evidences for Pharmacological Activities

While the therapeutic significance of *H. isora* was recognized earlier, substantial experimental evidence has only recently appeared. The age of several documented pharmacological activities is less than ten years. Many extracts have been shown to exhibit pharmacological attributes like antioxidant, antimicrobial, anti-diabetic, anti-cancer, and anti-diarrheal effects; therefore, it is crucial to ascertain which extracts contain the most bioactive compounds and how they affect human health.

14.1 Antioxidant Activity

To improve safe drug delivery system antioxidant is a good choice in deep research (Hoque *et al.*, 2023). It has been observed that alcoholic and aqueous extracts from the fruits and bark of *H. isora* exhibit antioxidant activity, including the ability to scavenge free radicals, toxicity towards tumor cells, and protection against normal cells. However, in cell-free systems, the majority of them are restricted to preliminary analysis (Bhat *et al.*, 2012). Differential cellular response of methanolic fruit extract (50%) of *H. isora* was proposed by Pradhan *et al.*, (2008). They demonstrated that while the extract preserved normal human blood lymphocytes, it had strong anticancer action in melanoma cells. Raman *et al.*, (2012) reported strong anticancer activity and presence of antioxidants in acetone fruit extract of *H. isora* (Raman *et al.*, 2012).

14.2 Antimicrobial Activity

H. isora fruits, both alcoholic and aqueous, have been shown by some researchers to exhibit antibacterial efficacy against a variety of bacterial species. Antimicrobial properties of *isora* roots butanol extract against many microorganisms were demonstrated by Venkatesh *et al.*, (2007). According to Shriram *et al.*, (2010), many bacterial strains' antibiotic-resistant R-plasmid can be removed by the fruit's acetone extract, increasing the strains' sensitivity to low antibiotic dosages. The cured derivatives' numerous antibiotic resistances were reversed by such plasmid loss, leaving them susceptible to low antibiotic doses. Subsequently,

it was proposed that *H. isora* acetone extracts could serve as a natural source of anti-plasmid drugs and as a sensitizer of multidrug-resistant genes found in pathogenic bacteria (Shriram *et al.*, 2010).

14.3 Anti-Diabetic Activities

The root extract of *H. isora* has been shown to have insulin-sensitizing, anti-hyperglycemic, and hypolipidemic properties in cumulative research, indicating that the extract may be useful in the treatment of type 2 diabetes (Kumar *et al.*, 2013). According to Kumar and Molokanova's (2013) experimental research, administering rats with diabetes aqueous bark extract significantly reduced the amount of lipid peroxidation products while also restoring the heart's natural levels of endogenous antioxidants. Simultaneously, after treatment with an aqueous extract from *H. isora*'s bark, diabetic rats' brain activity for endogenous enzymes and plasma insulin significantly increased (Kumar *et al.*, 2007). These findings suggested that the aqueous extract from *H. isora*'s bark may have an antiperoxidative function, protecting the brain's membranes from damage caused by lipid peroxidation. Furthermore, a histological analysis conducted in the laboratory of Venkatesh *et al.*, (2010) provided compelling evidence of the restoration of normal size in the liver, renal glomeruli, and pancreatic islets following treatment with *H. isora* root extract. According to Bhavsar *et al.*, (2009), saponins from *H. isora* have anti-diabetic effects by activating the PI3K/Akt pathway, which phosphorylates and inactivates GSK-3 α/β . This, in turn, stimulates the synthesis of glycogen and increases the amount of glucose that is transported across the cell membrane by Glut4 (Bhavsar *et al.*, 2009).

14.4 Hepatoprotective Effects

The traditional usage of this plant in the treatment of liver problems has a scientific basis according to research that suggests the ethanolic extract from the root and bark has hepatoprotective properties. According to Dhevi *et al.*, (2010), administering rats an ethanolic extract of *H. isora* bark caused all examined biochemical and antioxidant markers to completely reverse and recover. Moreover, the next year, blood samples from rats given ethanolic root extract of *H. isora* revealed much higher total protein and significantly lower levels of serum indicators (Chitra *et al.*, 2009).

14.5 Antibacterial and Anti-Plasmid Activities

Shriram *et al.*, reported organic extracts of *H. isora* as a new and safe plasmid curing agent. These discoveries highlighted the prospect of developing a novel class of antibiotic-drug combinations that could be useful in combating plasmid-encoded multidrug resistance. Because the bacteria in this investigation were already resistant to the amounts of curing agents being used, the concentrations of these compounds were sub-inhibitory. It can be anticipated that bacteria have a lower probability of developing a defense mechanism against

the plasmid curative effect of *H. isora*'s acetone extract (Shriram *et al.*, 2008).

14.6 Cardiac Antioxidant and Antiperoxidative Potency

Kumar *et al.*, reported that the activities of cardiac antioxidant enzymes were significantly decreased in diabetic control rats. They presented significant increases in the diabetic rats treated with hemagglutination inhibition (HI). Normal rats which underwent HI injections, and the antioxidant levels rose without any other noteworthy changes. The results of HI were identical to that of tolbutamide. The findings indicate that the antioxidant effect of the 200 mg/kg oral HI aqueous extract was much higher than that of the rats treated with tolbutamide (Kumar *et al.*, 2008).

14.7 Anticancer Activity

According to Varghese *et al.*, the medication exhibits a strong anti-human breast cancer effect. Alkaloids and flavonoids are the source of the drug's cytotoxic action. It must distinguish between these active principles, assess them, and clarify the precise mechanism of action (Varghese *et al.*, 2011).

14.8 Antinociceptive Activity

Significant antinociceptive efficacy was reported for the aqueous ethanol, petroleum ether, and chloroform extracts. According to a phytochemical examination of the active extracts, the pharmacological action that has been observed may be attributed to the primary ingredients sterol, triterpenoids (petroleum ether extract), and their glycosides (chloroform and aqueous ethanol extracts) (Venkatesh *et al.*, 2007).

14.9 Anti-Diarrheal Activity

The fruits, which have astringent and demulcent properties, help children with flatulence and bowel cramping. For diarrhea and dysentery, the bark is beneficial (Chopra *et al.*, 2012).

14.10 Reliability of the Brain's Antioxidation Defense

According to Kumar *et al.*, brain tissue in diabetics displayed elevated lipid peroxidation and was more susceptible to oxidative stress. The aforementioned finding indicates that the *H. isora* plant's aqueous bark extract has antioxidant activity, which may help prevent pathologic changes brought on by free radicals in diabetes (Kumar *et al.*, 2007).

Summary

This herb is used in traditional medicine to treat newborn constipation, diarrhea, and snake bites. *H. isora* is a small tree or large shrub that can reach a height of five to eight meters. Its bark is grey, and its ovate, hairy leaves have serrated margins and are arranged alternately. Its fruits are twisted and have a screw at the tip. They are green when raw and turn brown or grey when dried. Orange-red or brick-red flowers adorn this

plant. Antioxidants, carbohydrates, proteins, fiber, calcium, phosphorus, and iron are all abundant in *H. isora*. In conclusion, according to scientific research, pharmacognosy analysis of plant parts is necessary for the authentication of drugs made up of several chemical constituents that demonstrate application on the human body, such as various *Helicteres* parts. This plant demonstrated various pharmacological actions into human physiological system.

Conflict of Interest: None declared.

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