

Chapter 3

Acanthus ilicifolius L.: a medicinal plant of Mangroves

**Gireesh Tripathi¹, Banshidhar Behera², Sugimani Marndi³, Emdad Hossain⁴,
Sanjeet Kumar³ and Asim Panda^{5*}**

¹Department of Pharmacy, Shri Krishna University, Chhatarpur, Madhya Pradesh, India

²Department of Dravyaguna, Ayurvedic & Unani Tibbia college and Hospital, Karolbagh, New Delhi, India

³Ambika Prasad Research Foundation, Odisha, India

⁴Department of Pharmaceutical Technology, Jadavpur University, Kolkata, West Bengal, India

^{5*}Department of Botany, Raidighi College, West Bengal, India

*Email-Id: panda1asim@raidighicollege.org.in

ABSTRACT

Acanthus ilicifolius is a mangrove plant with leaves that look like spiny holly leaves. All parts of the plant show secondary metabolites that cure different diseases, as per traditional systems of medicine, including Ayurveda. Active compounds such as alkaloids, glycosides, saponins, flavonoids, and steroids are present. Therefore, the current study emphasizes its significance in botany, pharmacology, ethnomedicine, and economics, with the aim of drawing attention to its conservation aspects in the wild.

Keywords: *Acanthus*, traditional knowledge, secondary metabolites, pharmacological uses

INTRODUCTION

Mangrove forests are a beautiful gift of nature. Not only they are a wondrous sight to behold, but the benefits and resources they provide are endless. Mangroves are well known for their natural barrier that protects nearby areas by reducing erosion and absorbing storm surge impacts during extreme weather events like tsunamis and cyclones. The network of roots and lush vegetation filters pollutants and traps sediments. It can also store up to four times more carbon than other tropical forests. Many wildlife species use the habitat as a nesting, breeding, and nursing ground.

Due to the morphology of mangrove plants, some faunal species also consumed roots and leaves such as wild boar and barking deer. Millions of people residing near mangroves rely for food, income, and well-being. Particularly the forest water provides an abundance of fish for local fishermen to sell and maintain financial stability. Mangrove forests can be found in different forms such as arched prop roots into the water like *Rhizophora*. Other shoot up vertical “Pneumatophores” or shoot root from the mud. Stilts roots are typical roots that protrude above the ground from the tree’s main trunk. The Ministry of Environment, Forests and Climate Change (MOEF & CC) published 38 mangrove sites in India in 2021 (<https://moef.gov.in>). Mangrove sites are found across the world. However, the greatest diversity of species is found in Southeast Asia.

Acanthus is a genus of a major group of angiosperms of more than 30 species of mangrove that are widely distributed in the tropical and subtropical regions of the world (**Pradhan et al. 2022**). *Acanthus* is derived from a Greek word meaning spiny due to the spiny nature of the plant. Among all the species of *Acanthus*, *Acanthus ilicifolius* has numerous medicinal potentials and is commonly found in India. It is mainly found just above the high tide mark. It can be easily distinguished by its spiny leaves its light green or purple flower, its thick branched stem; and its roots rarely above the ground (**Patel et al. 2020**). The leaf is an important character as it implies the presence of salt glands which help to cure many diseases. It is also pollinated by bees, wasp, birds and butterflies (**Akter et al. 2020**). It is used for economic purposes as leaves of *A. ilicifolius* is used as a food processing product and sold in market areas in Indonesia (**Basyuni et al. 2019**). In 2024, Widayanti et al. reported the endophytic fungi isolate from Jeruju leaves which has potential as an antibacterial activity. *A. ilicifolius* reported to contain bioactive compounds including alkaloid and wide range of glycosides (**Velmani et al. 2016; Bose and Bose 2008**). Folklore claim for different medicinal properties of *A. ilicifolius* as blood purifies, diabetes, hepatitis, leprosy (**Velmani et al. 2016; Saranya et al. 2015**). Endophytic fungi are microbes that live upon in plant tissue and can synthesize the bioactive compounds as their hosts. Andriani et al. reported that it is used as a phytoremediation agent for copper in Indonesia (**Andriani et al. 2020**).

As *A. ilicifolius* possess a long history of its medicinal value as per the traditional value in ayurveda and Chinese medicine. Therefore, authors have collected data on its pharmacological, along with ethnomedicinal uses through literature and field survey of *A. ilicifolius*. Photographs are also provided for easy identification in the field.

DESCRIPTION

It is a shrub with sessile or subsessile, oblong, rigid leaves, and secondary nerves that extend into spines. The flowers are blue, arranged in terminal or pseudo-axillary spikes. The bracts are ovate, acute, mucronate, or spinous-tipped, while the bracteoles are similar but somewhat smaller. The larger outer sepals have nerves that may sometimes extend into two teeth. The lip is pubescent on the inside, and the anthers are very shaggy. The capsule is elongated (Saxenna and Brahmam, 1995; Figures 1-2).

BIOACTIVE COMPOUNDS

The literature survey on bioactive compounds revealed the presence of 2-benzoxazolinone, lignan glycosides, benzoxazinoide glucosides, flavone glycosides, alkaloid, flavonoid, tannin, saponins, terpenoid, steroids, total phenols in benzene, ethyl acetate, lignan glycosides, Z- form 4- coumaric acid glycosides, cardiac glycosides, catechol, and phenylethanoid (Bose and Bose 2008; Mohammad et al. 2017; Kanchanapoom et al. 2001; Kanchanapoom et al. 2001; Wu et al. 2003; Sari et al. 2022;

ETHNOMEDICINAL USES

It is used to treat skin diseases (Velmani et al. 2016). It is used to treat respiratory problems, nervous problems, gastrointestinal, skin diseases, and urinary tract problems (Matos et al. 2022). It is used to treat oral candidiasis (Revianti et al. 2023). Leaves are used to treat osteoporosis (Kiem et al. 2008). Fruit, leaves, bark, and roots have been used for asthma, diabetes, hepatitis, inflammation, tumor, cancer, and rheumatoid treatments (Firdaus et al. 2013). Paste of leaves is used to treat expectorant. Tea brewed from the leaves reliefs pain and it purifies blood. Boiled root is used to treat leucorrhoea (Velmani et al. 2016). The plant is used to treat rheumatic complaints. Whole plant is used to treat inflammation. A decoction of whole plant with sugar candy and cumin is used to treat dyspepsia with acid eructation (Saranya et al. 2015).



Figure 1: Flower of *Acanthus ilicifolius*



Figure 2: Habit and habitat of *Acanthus ilicifolius*

PHARMACOLOGICAL ACTIVITY

It possesses analgesics, anti-inflammatory, antioxidant, anticancer, antileukemia, antimicrobial (Pothiraj et al., 2021), antifungal, antiviral, cytotoxicity, hepatoprotective activities, anticoagulation, antileishmanial, osteoblastic, antiulcer, anti-pathogenicity, chemopreventive activity and insecticides (Basyuni et al. 2019; Mohammad et al. 2017; Bose and Bose 2008; Sari et al. 2022; Prananingrum et al. 2022; Biswas et al. 2019; Sravya et al. 2023; Pradhan et al. 2022). Leaves are used for anti-aging cosmetics (Nusaibah et al. 2021). Flowers of *A. ilicifolius* possess antioxidant and cytotoxic activity (Firdaus et al. 2013).

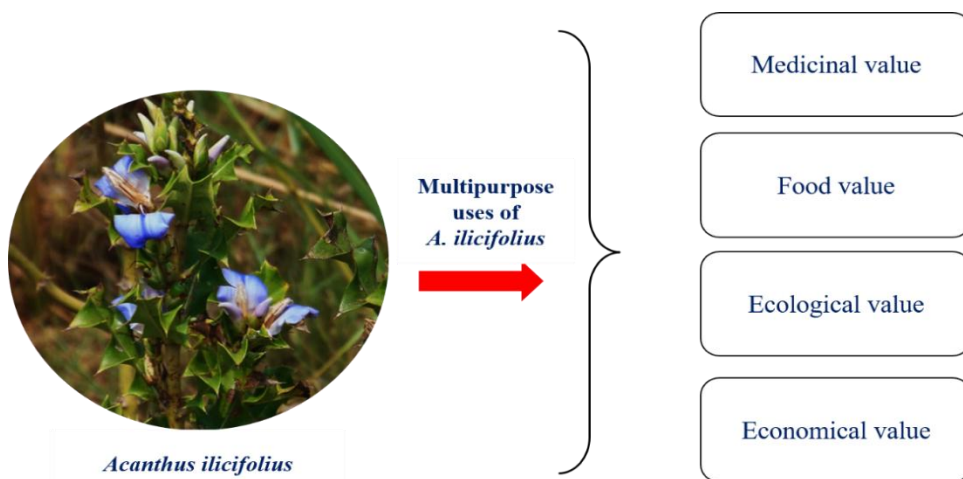


Figure 3: Multipurpose uses of *A. ilicifolius*

CONCLUSION

Worldwide, people extensively use *Acanthus ilicifolius* for its ecological, medicinal, and economical aspects (Figure 3). *Acanthus ilicifolius*, a highly used mangrove plant, is in high demand in the pharmaceutical industry due to its varying active compounds. It is also widely known as sea holly or holy mangrove. Most mangrove plants exhibit unique medicinal properties. Therefore, future research will focus on extracting the active compounds of *A. ilicifolius* for its pharmaceutical aspects.

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