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RESEARCH ARTICLE

BIOACTIVE POTENTIAL OF SEAGRASS *ENHALUS ACOROIDES*: A REVIEW

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ABSTRACT

Background: A marine angiosperm named *Enhalus acoroides* inhabits shallow, soft substrates like muddy or sandy areas. It flourishes above the average low water springs and is generally found in mixed meadows with *Thallassia* species. The Western Pacific Ocean and tropical Indian coastlines are home to this largest seagrass species. Over the past ten years, *Enhalus acoroides* has received a lot of attention from marine bioprospecting researchers. ***Objective:*** This review provides information on the phytochemical components, and therapeutic properties of *Enhalus acoroides*. *Enhalus acoroides* extract yields a variety of compounds when it is dissolved in various solvents, including sugars, terpenoids, coumarins, xanthoproteins, and carboxylic acid. Numerous studies have shown that it has bioactive potentials, including antibacterial, antifungal, and antifouling abilities. This review's goal is to orient readers with *Enhalus acoroides*' phytochemical makeup and current bioprospecting scenario. ***Conclusion:*** Since many epidemics and pandemics are spreading throughout the globe, the demand for alternative sources for drug discovery is an inevitable research area, and seagrass is a reliable natural source, this is an ideal time to conduct additional research on it and discover various pharmacological activities without side effects. This review brings together a thorough collection of phytochemical, and biomedical applications of seagrass *Enhalus acoroides* from all over the world over the last two decades. The future works that need to be done for identifying biomedical applications of seagrass resources is also highlighted in this review.

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INTRODUCTION

A systematic and orderly hunt for beneficial compounds obtained from natural sources such as plants, microorganisms, animals, etc. is recognised as bioprospecting and these products can then be developed further for commoditization for the advantage of humanity in general. In other words, it is the investigation of bioresources for metabolites, macromolecules, biochemical, and genetic information that may be developed into economically useful commodities for the agricultural, aquaculture, environmental remediation, personal care products, nano-science, or drug industry. In today's world, the emergence of novel ailments and the catastrophic modifications in the mechanism of action of disease-causing organisms necessitate the quest for unique active compounds from sustainable resources. The innovation of marine bioprospecting results from this circumstance. Being the world's largest and most stable ecosystem, marine ecosystems cover roughly 71% of the planet's surface and are essential to the environment. As a "focused and systematic search for materials, bioactive compounds, or genes within marine organisms," marine bioprospecting can refer to a variety of organisms, including smaller ones like bacteria, fungi, and viruses as well as larger ones like marine plants, shellfish, and fish. It enables the utilisation of naturally active compounds produced by marine species. Finding antibiotics with distinct properties to which organisms may not have developed resistance is urgently needed due to the current situation's rapid proliferation of novel pathogenic organisms, and the search for novel antibiotics is an ongoing process (1).

Seagrasses are far less analysed than other aquatic habitats despite the fact that they are the main source of food for numerous species and are critical to the survival of marine coastal lifeforms and human wellbeing.The only angiosperms that can grow in a marine ecosystem are seagrasses, which have evolved to live out their entire lives as partly or entirely submerged vegetation. They typically live in shallow intertidal and midtidal zones that obtain more light. In addition to their advantages for the environment, seagrasses are a powerful marine source for a variety of natural products that can be used to make drugs. The bioactive potential of seagrass, *Enhalus acoroides*, is thoroughly discussed in this review.

Enhalus acoroides*:* It belongs to the Hydrocharitaceae family and is frequently referred to as Tape Seagrass. Large seagrass called *Enhalus* is found exclusively in tropical Indian and Western Pacific Oceans' coastal waters. The fact that this species performs aerial surface pollination exclusively makes it unique among seagrass species. Large round fruits (4–6 cm in dia), long strap-like leaves, and massive rhizomes (1.5 cm in dia) are all characteristics of *Enhalus acoroides*.

BIOACTIVITY OF *Enhalus acoroides:* The bioactive potential of seagrass has been demonstrated by existing research, making it a promising candidate for pharmaceutical research and other uses. The discovery of novel compounds from *E. acoroides* with potentially active properties has a great deal of potential, according to earlier studies on their antitumor activity (2).

Table 1. Bioactivity of *Enhalus acoroides*

Extract	Biological activity	Reference
Ethanol extract	Antioxidant	(8)
Aqueous methanol	Antioxidantand Haemolytic activity	(8)
Ethanol extract	Antioxidant	(9)
Methanol, ethyl acetate, nhexane	Antioxidant	(10)
Ethanol	Antifeedant, antibacterial, and antilarval	(11)
N-hexane extract of bacterial symbionts	Antifouling	(12)
Ethanol	Nutritionalsupplements	(13)
N-hexane	Antibacterial	(14)
Ethyl acetate	Antioxidant property, antibacterial, antidiabetic and antitumor activities	(7)
Ethanol & hexane	Larvidial	(15)
Ethyl alcohol	Cytotoxic activities	(2)
Methanol	Antibacterial	(4)

Table 1 summarizes the bioactivity of *Enhalus acoroides*. From the phytochemical screening tests ethyl acetate extract of *E. acoroides* has been found to contain polyphenols, flavonoids, and have antioxidant activity in a recent study. Therefore plant *Enhalus acoroides* has the potential to be used as a substitute for natural antibiotics as it contains polyphenols and flavonoids (3).

According to another study the Methanolic extract of E. acoroides contains alkaloids, flavonoids, saponins, and steroids, whereas the n-hexane extract of E. acoroides contains steroids and flavonoids and it also indicate that the yield of *Enhalus acoroides* extract in methanol solvent is importantly higher than that in n-hexane (4). In addition to flavonoids, triterpenoids, steroids, saponins, and tannins are also present in *Enhalus acoroides*, according to studies by Baby et al.(5) and Gustavina et al. (6). Another study found that *E. acoroides* contains unique phytocompounds including triacontane, 1-nonadecene, and n-tetracosanol-1which has antibacterial, antioxidant, anti-diabetic, and antitumor properties (7).

CONCLUSION

The search for new seagrass compounds with high levels of antioxidants like polyphenols, terpenoids, flavonoids, tannins, and saponins for human welfare has increased as a result of recent research. There has been no further investigation into the isolation and antitumor effects of other secondary metabolites, despite the fact that some bioactive components from *E. acoroides*, such as flavonoids, sterols, and aliphatic acid, have already been isolated.

More work is required to locate, isolate, and quantify potential compounds from seagrasses despite the fact that researchers are working to locate, separate, and characterise anti-microbial compounds from seagrasses that will benefit human existence on Earth. In the future, it will be crucial to focus on separating minor bioactive components from seagrass and their endophytes with potential therapeutic relevance using sophisticated technology.

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GLOSSARY OF ABBREVATIONS

Dia: diameter
E. acoroides: Enhalus acoroides
N-hexane: Normal hexane

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