IV. INTERNATIONAL HALICH CONGRESS ON MULTIDISCIPLINARY SCIENTIFIC RESEARCH

August 4-5, 2022 / Istanbul, Turkey

THE PROCEEDINGS BOOK

Edited by
Dr. Mustafa Sarper ALAP
Gulnaz GAFUROVA

ISBN: 978-625-8323-92-4

IV. INTERNATIONAL HALICH CONGRESS ON MULTIDISCIPLINARY SCIENTIFIC RESEARCH

August 4-5, 2022 / Istanbul, Turkey

THE PROCEEDINGS BOOK

Edited by
Dr. Mustafa Sarper ALAP
Gulnaz GAFUROVA

Issued: 20.08.2022
ISBN: 978-625-8323-92-4

CONGRESS ID

IV. INTERNATIONAL HALICH CONGRESS ON MULTIDISCIPLINARY SCIENTIFIC RESEARCH

DATA AND PLACE

August 4-5, 2022 / Istanbul, Turkey

CONFERENCE CHAIR

Prof. Dr. Muhittin ELİAÇIK- Kırıkkale University

COORDINATOR

Gulnaz GAFUROVA

PRESENTATION

Oral Presentation/ Virtual

PARTICIPANTS COUNTRIES:

Turkey, Azerbaijan, Taiwan, Canada, Uzbekistan, Morocco, France, Bangladesh, Iraq, Nigeria, İndia, Indonesia, South Africa, Pakistan, Romania, Algeria, Vietnam, Uganda, Serbia

TOTAL NUMBER OF PAPERS

112

THE NUMBER OF PAPERS FROM TURKEY

53

OTHER COUNTRIES

59

EVALUATION PROCESS

All applications have undergone a double-blind peer review process

ANTIOXIDANT POTENTIAL OF SEAGRASSES: A REVIEW

Hazeena M Ameen[1]
Ayona Jayadev*
[1]Research Scholar and *Assistant Professor
Postgraduate Department of Environmental Sciences
All Saints' College, Thiruvananthapuram, 695007 Kerala, India

ABSTRACT

Marine organisms are highly productive, diverse, physiologically active, and chemically unique, which provide a great opportunity for the discovery of novel potential bioactives. Among marine flora, seagrasses have been used for a number of therapeutic purposes, including the treatment of fevers, mental illnesses, wounds, skin diseases, muscle pain, and stomach issues. Therefore, when examining their pharmacological action, it is crucial to understand their bioactive metabolites, medicinal capabilities, and biochemical pathways. A wide range of pharmacological effects, particularly antioxidant, antibacterial, immunostimulatory, and anti-tumor activity, have been exhibited by the bioactive molecules of seagrass. Secondary metabolite research trends have recently contributed to the development of drugs with a focus on their pharmacological potential, notably antioxidant potential. In cancer treatment, antioxidants are crucial for regression of premalignant lesions and thereby preventing them from transforming into cancer. Because of its numerous advantages, including anti-aging and anti-inflammatory properties, antioxidants have emerged as scientifically fascinating molecules. Thus, it requires a systematic investigation of novel and effective natural reservoirs for antioxidants. This review provides a thorough understanding of antioxidant potential of seagrasses.

Keywords: Seagrasses; bioprospecting; bioactive compounds; antioxidants; anti-cancerous.

INTRODUCTION

Antioxidants are compounds that can slow down cell damage caused by free radical molecules which is produced by the body in response to environmental and other stresses. In biological systems, antioxidants serve a variety of purposes, including protecting cells from oxidative damage and aiding within crucial cell signaling pathways. A variety of screening assays, including the highthrough-put relative DPPH radical scavenging capacity (RDSC) assay (Bhattarai et al., 2008) and the HO radical scavenging capacity (HOSC) assay (Cheng et al., 2006), were established and employed to look for promising antioxidants.

There are several synthetic antioxidants that are now in use, including tert-butylhydroquinone (TBHQ), butylated hydroxytoluene (BHT), and butylated hydroxyanisol (BHA). However, because of severe negative effects, their use is currently limited. These results have strengthened the efforts to create substitute antioxidants with a natural origin.

Finding new natural antioxidants from living systems for use in food, medicine, and cosmetics has garnered a lot of interest recently. The search for bioactive chemicals to create novel therapeutics has recently focused on a wide range of marine resources. Marine species are a rich source for finding therapeutically effective compounds. Many of the marine metabolites

recently discovered and widely available on the market have powerful pharmacological effects. (Thakur Narsinh et al, 2005). Many researchers concentrated their studies on marine invertebrates, seaweeds, and generally the abundantly present seagrasses are ignored. Therefore, seagrass might be recognized as a viable option when searching for novel sources of antioxidant compounds.

Seagrasses are the only angiosperms, that thrive in salty, marine conditions. These marine angiosperm habitats are found all over the world and are used by marine species as breeding and feeding grounds (Sakayaroj et al., 2010). The bioactive substance, which can be used to treat fever, skin conditions, muscle discomfort, and wound healing, is produced by seagrass in response to physical, chemical, and biological changes in the environment.

Seagrasses develop a range of new, structurally complex, and physiologically active metabolites to help them survive the harsh underwater environmental circumstances. The chemicals found in seagrass have a strong antioxidative nature, and seagrasses as a defensive mechanism, releases even more secondary metabolites when under stress. (Subhashini et al., 2013) There are numerous reports describing the antioxidant properties of the chemicals produced by seagrasses, which can prevent the oxidation of other molecules (Athiperumalsami et al 2010; Kannan et al, 2010). However, there are very few publications on the seagrass' phytochemical components and their bioactive ability. This review sheds light on the antioxidant capacity of seagrasses.

ANTIOXIDANTS

By capturing free radicals, antioxidants act as a radical scavenger and delay or prevent oxidation. Natural extracts' medicinal merits have frequently been linked to their antioxidant capacities. According to data, phytochemicals with antioxidant abilities are linked to a decreased risk of fatality (Dixon et al, 2005). The total antioxidant activity, total phenolic content, DPPH radical scavenging activity, hydrogen peroxide radical scavenging assay, nitric oxide radical scavenging assay, and reducing power were often used to assess the antioxidant capacity of seagrass extracts. The ability to scavenge free radicals is one of the antioxidant strategies, and it also appears that phenolic components are in charge of the antioxidant potential. Another method for understanding the mechanisms of action of antioxidants is to determine reducing power.

ANTIOXIDANTS FROM SEAGRASS

The significant importance of antioxidants in the prevention of diseases, has drawn the attention to the natural compounds isolated from marine plants, algae, and bacteria which are able to counteract oxidative stress induced by exogenous and endogenous causes. The antioxidant potential of marine resources has not yet been completely investigated. Seagrasses are a major source of antioxidant molecules, according to reports that have appeared more recently (Athiperumalsami et al, 2010; Kannan et al, 2010; Kannan et al, 2012). A number of diseases may be prevented by the antioxidant activity of seagrasses, which may be caused by the abundance of phytochemical constituents such phenols, flavonoids, and tannin. Natural antioxidants are more efficient in scavenging free radicals and have less adverse effects than synthetic antioxidants, making research on them more interesting and valuable for the society. Table 1 summarizes the seagrasses' antioxidant potential.

Table 1: Antioxidant potential of seagrasses

Extract	Seagrass species	Reference
Ethanol extract	*Enhalus acoroides*	Kannan et al, 2010
Aqueous methanol	*E. acoroides, Thalassia. hemprichii, Halodule pinifolia, Syringodium isoetifolium*	Kannan et al, 2010
Methanol extract	*H. pinifolia, Halophila ovalis, S. isoetifolium, T. hemprichii, Cymodocea serrulate*	Athiperumalsami et al, 2008
Ethanol extract	*E. acoroides, H. ovalis, Halophila ovate, Halophila stipulacea, T. hemprichii, S. isoetifolium, C. serrulata, H. pinifolia*	Kannan et al, 2012
Methanol, ethyl acetate, n hexane	*T. hemprichii, C. rotundata, E. acoroides, S. isoetifolium*	Santoso et al, 2012
n-hexane, ethyl acetate, ethanol	*H. pinifolia*	Baehaki et al, 2017
Methanol, acetone hexane extracts	*H. pinifolia, H. ovalis* and *S isoetifolium*	Girija et al, 2013
Ethanol	*C. serrulata*	Bharathi et al, 2019
Methanol	*S. isoetifolium*	Bharatharathna & Santhanam, (2019)
Sulfated polysaccharide extract	*Cymodocea nodosa*	Kolsi et al, 2017
70% Acetone	*Cymodocea rotundata* and *C. serrulata*	Wisespongpand et al, 2022

According to a current study conducted, the seagrass *Haliphila stipulacea* may serve as a natural source of antioxidant agent that protects fibroblast cell lines from oxidative damage (Sansone et al, 2021). The *Halophila ovalis* methanol extract had notable antibacterial, anti-inflammatory, and antioxidant properties, making it a viable source for natural health supplements (Yuvaraj et al,2012). In a recent study, the effects of heatwaves on the antioxidant activity of the seagrass *Cymodocea nodosa* were examined. The results showed that *Cymodocea nodosa* may exhibit signs of stress during a four-day heatwave at 40 °C, as seen by the rise in antioxidant response (Costa et al, 2021).The bioactive compounds from seagrasses have inherent antioxidant action, according to (Kolsi et al, 2017). According to a recent study, the most effective antioxidants were the phenolic components of *Thalassia hemprichii* and *Cymodocea serrulata* extracts (Ghandourah et al, 2021). The potential of seagrass as a natural source of antioxidants was recently discovered when extracts from *Posidonia oceanica* leaves were analyzed for their polyphenolic content and antioxidant capability (Messina et al, 2021). The findings of recent studies indicate that *Syringodium*

isoetifolium has strong antioxidant properties, which may be the basis for the plant's therapeutic benefits. (Kalaivani et al,2021).

CONCLUSION

Owing to the bioactive qualities of seagrass compounds, in addition to playing an important ecological function, seagrass has the potential to be a valuable resource for human health. Recent studies revealed that seagrasses are unique source of powerful antioxidants and are loaded with nutraceutical properties. Additional investigations are required to investigate the potential compounds of seagrasses using various methods, such as HPLC-DAD and NMR, so that the conclusions can be incorporated to clinical studies.

ACKNOWLEDGMENT

The authors are grateful to faculty of ALL SAINTS' COLLEGE and UNIVERSITY OF KERALA for providing the required facilities.

STATEMENTS AND DECLARATIONS

The authors declare that there are no other conflicts of interest. This article does not contain any studies involving human participants performed by any of the authors.

FUNDING

No funding was received to assist with the preparation of this manuscript.

REFERENCES

1. Athiperumalsami, T., Rajeswari, V. D., Poorna, S. H., Kumar, V., & Jesudass, L. L. (2010). Antioxidant activity of seagrasses and seaweeds.
2. Athiperumalsami, T., Kumar, V., & Jesudass, L. L. (2008). Survey and phytochemical analysis of seagrasses in the Gulf of Mannar, southeast coast of India.
3. Bharatharathna, P., & Santhanam, P. (2019). Analyses of phytochemical, biochemical, pigments and antioxidant activity of seagrass *Syringodium isoetifolium*. Journal of Advanced Scientific Research, 10(4 Suppl 2).
4. Bharathi, N. P., Jayalakshmi, M., Amudha, P., & Vanitha, V. (2019). Phytochemical screening and in vitro antioxidant activity of the seagrass *Cymodocea serrulata.*
5. Bhattarai, H. D., Paudel, B., Hong, S. G., Lee, H. K., & Yim, J. H. (2008). Thin layer chromatography analysis of antioxidant constituents of lichens from Antarctica. *Journal of Natural Medicines*, *62*(4), 481-484.
6. Cheng, Z., Moore, J., & Yu, L. (2006). High-throughput relative DPPH radical scavenging capacity assay. *Journal of agricultural and food chemistry*, *54*(20), 7429-7436.
7. Costa, M. M., Silva, J., Barrote, I., & Santos, R. (2021, June). Heatwave effects on the photosynthesis and antioxidant activity of the seagrass *Cymodocea nodosa* under contrasting light regimes. In *Oceans* (Vol. 2, No. 3, pp. 448-460). MDPI.
8. Dixon, R. A., Xie, D. Y., & Sharma, S. B. (2005). Proanthocyanidins–a final frontier in flavonoid research?. *New phytologist*, *165*(1), 9-28.
9. Ghandourah, M., Hawas, U. W., Abou El-Kassem, L. T., & Shaher, F. M. (2021). Fatty Acids and Other Chemical Compositions of Some Seagrasses Collected from the Saudi Red Sea with Potential of Antioxidant and Anticancer Agents. Thalassas: An International Journal of Marine Sciences, 37(1), 13-22.
10. Girija, K., Parthiban, C., Hemalatha, A., Saranya, C., & Anantharaman, P. (2013). Evaluation of antioxidant activities and preliminary phytochemical analysis of

seagrasses *Halodule pinifolia, Halophila ovalis* and *Syringodium isoetifolium*. The J. Phytochem, 114, 181-187.

11. Kalaivani, P., Kavitha, D., & Amudha, P. (2021). In vitro Antioxidant activity and Phytochemical composition of *Syringodium isoetifolium*. *Research Journal of Pharmacy and Technology*, *14*(12), 6201-6206.
12. Kannan Rengasamy, R. R., Rajasekaran, A., Micheline, G. D., & Perumal, A. (2012). Antioxidant activity of seagrasses of the Mandapam coast, India. *Pharmaceutical biology*, *50*(2), 182-187.
13. Kannan, R. R. R., Arumugam, R., & Anantharaman, P. (2010). Antibacterial potential of three seagrasses against human pathogens. Asian Pacific Journal of Tropical Medicine, 3(11), 890-893.
14. Kannan, R. R. R., Arumugam, R., & Anantharaman, P. (2010). In vitro antioxidant activities of ethanol extract from *Enhalus acoroides* (LF) Royle. *Asian Pacific Journal of Tropical Medicine*, *3*(11), 898-901.
15. Kannan, R. R. R., Arumugam, R., & Anantharaman, P. (2012). Chemical composition and antibacterial activity of Indian seagrasses against urinary tract pathogens. Food chemistry, 135(4), 2470-2473.
16. Kolsi, R. B. A., Gargouri, B., Sassi, S., Frikha, D., Lassoued, S., & Belghith, K. (2017). In vitro biological properties and health benefits of a novel sulfated polysaccharide isolated from *Cymodocea nodosa*. *Lipids in health and disease*, *16*(1), 1-11.
17. Messina, C. M., Arena, R., Manuguerra, S., Pericot, Y., Curcuraci, E., Kerninon, F., & Santulli, A. (2021). Antioxidant Bioactivity of Extracts from Beach Cast Leaves of *Posidonia oceanica* (L.) Delile. *Marine Drugs*, *19*(10), 560.
18. Sakayaroj, J., Preedanon, S., Supaphon, O., Jones, E. G., & Phongpaichit, S. (2010). Phylogenetic diversity of endophyte assemblages associated with the tropical seagrass *Enhalus acoroides* in Thailand. *Fungal Diversity*, *42*(1), 27-45.
19. Sansone, C., Galasso, C., Lo Martire, M., Fernández, T. V., Musco, L., Dell'Anno, A., & Brunet, C. (2021). In Vitro Evaluation of Antioxidant Potential of the Invasive Seagrass *Halophila stipulacea*. *Marine drugs*, *19*(1), 37.
20. Santoso, J., Anwariyah, S., Rumiantin, R. O., Putri, A. P., Ukhty, N., & Yoshie-Stark, Y. (2012). Phenol content, antioxidant activity and fibers profile of four tropical seagrasses from Indonesia. Journal of Coastal Development, 15(2), 189-196.
21. Subhashini, P., Dilipan, E., Thangaradjou, T., & Papenbrock, J. (2013). Bioactive natural products from marine angiosperms: abundance and functions. *Natural products and bioprospecting*, *3*(4), 129-136.
22. Thakur, N. L., Thakur, A. N., & Müller, W. E. (2005). Marine natural products in drug discovery.
23. Wisespongpand, P., Khantavong, A., Phothong, P., & Wanghom, W. (2022). Antimicrobial, Antioxidant, and Antifouling Activity from Extracts of Aboveground and Belowground Parts of Seagrasses *Cymodocea rotundata* and *Cymodocea serrulata*. *Journal of Fisheries and Environment*, *46*(1), 37-53.
24. Yuvaraj, N., Kanmani, P., Satishkumar, R., Paari, A., Pattukumar, V., & Arul, V. (2012). Seagrass as a potential source of natural antioxidant and anti-inflammatory agents. *Pharmaceutical biology*, *50*(4), 458-467.