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Popular Article on Application of Seaweed in Aquaculture

Elias C. Wahlang[1] and M.K. Yadav[1]

[1] *Department of Aquaculture, School of Agriculture, Sanjeev Agarwal Global Education University, Bhopal*

Corresponding Author
Elias C. Wahlang
Email: eliaswahlang07@gmail.com

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ABSTRACT

This article examines the utilization of seaweed in aquaculture as a sustainable solution for addressing challenges faced by the global aquaculture industry. In recent years, seaweeds have experienced a surge of interest in the realm of aquaculture due to their nutritional profile and environmental benefits. It explores the benefits of seaweed cultivation, including its role in improving water quality, providing habitat for biodiversity, and mitigating climate change impacts. The article also discusses different methodologies used in seaweed cultivation, their scalability, challenges, and future prospects. This paper explores the use and potential of seaweeds in aquaculture, assessing methodologies in cultivation, scope, and potential problems. A comprehensive analysis of research papers and studies is conducted to provide a thorough overview of seaweed's potential in aquaculture. The conclusion will purposefully revisit the potential future applicability of seaweeds within the blue economy.

KEYWORDS

Seaweeds, photosynthesis, habitat, aquaculture, biodiversity

Introduction

Aquaculture, the practice of cultivating aquatic organisms, is vital for meeting the increasing demand for seafood. However, this industry faces significant challenges, such as environmental degradation, resource unsustainability, and climate change impacts. In light of the need for sustainable practices, the integration of seaweed in aquaculture has emerged as a promising solution. Seaweed cultivation offers several benefits, including improved water quality, enhanced biodiversity, and climate change mitigation. Seaweed also plays an important role in coastal ecosystems. Seaweed provides food and habitat for marine species, cleans coastal waters by removing excess nutrients from runoff, and absorbs carbon dioxide from the water, which protects shelled animals from ocean acidification. Although it may flood the sea, seaweed functions in very much the same way that it takes in carbon dioxide and produces oxygen as part of photosynthesis. This article aims to explore the potential of seaweed in aquaculture and its implications for the future.

Seaweeds, including red, brown, and green species, are increasingly recognized for their capacity to bolster the blue economy. Being rich in valuable nutrients like iodine, calcium, and protein, they serve as a rich, sustainable feed for various cultivated species. Moreover, seaweeds are photosynthetic organisms that absorb CO2, thus reducing ocean acidification, which harms many shell-building species in aquaculture. Coral, oysters, and clams, amongst others, thrive better with the introduction of seaweeds, resulting in greater productivity and economic gain.

Benefits of Seaweed Cultivation in Aquaculture

Seaweed, or macroalgae, serves as an efficient biofilter by absorbing excess nutrients from the water, thereby enhancing water quality and reducing eutrophication risks associated with aquaculture activities. Additionally, seaweed acts as a habitat and food source for marine organisms, promoting biodiversity within aquaculture systems. These ecological services contribute to a well-balanced and resilient ecosystem.

Seaweed's Role in Climate Change Mitigation

Seaweeds are known for their ability to sequester carbon dioxide (CO2) from the atmosphere, thereby reducing greenhouse gas emissions. Through photosynthesis, seaweed utilizes CO2 as a raw material, making it an effective tool for climate change mitigation. Furthermore, cultivated seaweed can be used as a sustainable source of biofuel or biogas, providing additional renewable energy options.

Methodology for Seaweed Cultivation

Seaweed cultivation incorporates various methodologies, including offshore longline systems, semi-submersible culture systems, and integrated aquaculture systems. Offshore longline systems involve growing seaweed on suspended ropes or lines in the water column, while semi-submersible systems use floating structures to cultivate

seaweed just below the water's surface. Integrated aquaculture systems integrate fish or shellfish farming with seaweed cultivation in a symbiotic relationship. These methodologies are flexible, scalable, and suitable for different aquaculture environments.

Challenges and Future Prospects

Despite the numerous benefits, seaweed cultivation in aquaculture faces challenges such as regulatory issues, limited market demand, and technical limitations for large-scale cultivation. However, ongoing research and technological advancements offer opportunities to overcome these barriers. Successful integration of seaweed aquaculture requires collaboration among stakeholders, policymakers, and researchers. Developing effective marketing strategies, increasing consumer awareness, and addressing regulatory frameworks are crucial for the industry's growth.

Conclusion

Seaweed cultivation presents a sustainable solution for the aquaculture industry, addressing environmental concerns while providing economic opportunities. It improves water quality, enhances biodiversity, and contributes to climate change mitigation. The diverse methodologies used in seaweed cultivation provide flexibility and scalability. Though challenges exist, ongoing research and innovation hold promise for the future of seaweed in aquaculture. Embracing this emerging field requires collective efforts from industry players, policymakers, and researchers. Through such collaborative efforts, aquaculture can transition towards a more sustainable and resilient future.

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