Water Purification Potentials of Crustacean Chitosan

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Abstract

Chitin is the structural component exoskeleton of various organisms, mainly insects, lobsters, shrimp, and crabs. The unique properties of chitin confer a wide range of applications on the polymer. Chitosan is a polysaccharide produced from the alkalescent deacetylation of chitin. The properties of chitosan, which make it indispensable in aquaculture and water purification, include solubility in acidic solutions, high water holding capacity, biocompatibility, biodegradability, nontoxicity, bioactivity, and polycationic nature. These properties are significantly expressed when the deacetylation has high efficiency, characterized by the quantity of the chitosan yielded. However, the quality of chitosan depends on the source of the chitin used. Studies have shown that chitin sourced from crustaceans may be the most effective in improving water quality for aquaculture systems. A comprehensive understanding of the interactions of chitosan with its surroundings is required for improved knowledge of the possible modifications to the biopolymer. The unique chitosan has shown outstanding efficiency of nutrient delivery in aquaculture systems. The chitosan can circulate the micronutrients to the target tissues through the blood plasma in a physiologically significant amount. This minimizes the chances of unutilized nutrients causing pollution problems in the aquaculture system. Detailed comparative study on the efficiency of crustacean-sourced chitosan on a species and taxa basis may break new grounds in water purification and treatment techniques. Comparative phylogenetic analysis of chitosan from various sources with crustacean sources holds the key to a better understanding of the correlations between genetic diversity and efficiency variations. This may be a milestone in the fisheries and aquaculture sector. Such a comparative investigation should focus on removing suspended solids, dissolved solids, BOD, COD, and free chlorine to establish its suitability. This provides an overview of the composition of crustacean chitosan, which is a naturally occurring polysaccharide with a wide range of applications in food, cosmetic, and pharmaceutical industries. The review focuses on the primary components of crustacean chitosan, including glucosamine, glucuronic acid, N-acetylglucosamine, and N-acetylgalactosamine, as well as their relative ratios. In addition, the review discusses the effects of various processing techniques on the composition of crustacean chitosan and its impact on the various applications. Finally, the review compares the composition of crustacean chitosan to that of other chitosans, such as fungal and bacterial chitosan. This

report explores the superiority of crustacean chitosan over other sources of chitosan, such as those sourced from insects, bacteria, and algae.

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