

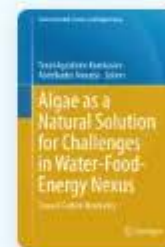


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Safety, Toxicological and Allergenic Aspects of Using Algae for Food

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Algae as a Natural Solution for Challenges in Water-Food-Energy Nexus

[Christine Kyarimpa](#), [Tom Omute](#), [Caroline K. Nakiguli](#), [Alice V. Khanakwa](#), [Christopher Angiro](#), [Ivan Kahwa](#), [Fortunate Ahumuza](#) & [Timothy Omara](#)

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Abstract

Consumption of algae has been historically practiced, especially in East Asia and the Pacific region cultures. However, sporadic events and empirical studies have suggested that some compounds could be triggering intoxications, allergic reactions and mortalities in humans who consumed algae. This chapter is an effort to explore with in-depth attention the safety, toxicological and allergic reactions following human consumption of algae. Based on retrieved literature, it is clear that toxicities and allergies from ingestion of algae are not a rarity, and to date, at least seventy (70) illnesses, six (6) allergic reactions and fourteen (14) mortalities have been reported globally. Toxicities and mortalities from intake of edible algae has been reported in species of *Gracilaria*, *Caulerpa* and *Acanthophora* genus, and are associated with their bioaccumulation of contaminants such as excess iodine, heavy metals, cyanotoxins or toxic inherent compounds such as caulerpenyne, manauelides A and C, prostaglandin E₂, polycavernosides, aplysiatoxins and their derivatives. Allergenicity has been reported in *Arthrospira*, *Chlorella*, *Chondrus*, *Eucheuma*, *Gigartina* and *Palmaria* species, with the sulfated polysaccharide (carrageenan) and the photosynthetic pigment (C-phycoyanin) being the implicated allergens. These allergic reactions are mediated through activation of innate immune pathways of inflammation that trigger NF- κ B activation, modification of gut microbiota and thickness of mucus barrier. We contend that appropriate labelling of algae-derived food products, public education, proper cleaning of fresh algae before consumption and profiling of toxic and allergenic algal species and compounds could aid in reducing intoxications and allergic reactions from algae used in food and food products. Future studies should consider examining edible algae for contaminants of emerging concern such as microplastics, cyanotoxins, emerging per- and polyfluoroalkyl substances, pharmaceutical residues and personal care products.

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