Floraciones de Cianobacterias: Impacto, técnicas de estudio y Estrategias de Mitigación: Revisión

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RESUMEN
Las cianobacterias, microorganismos fotosintetizadores aeróbicos con una historia evolutiva de más de 3500 millones de años, representan una fusión única entre bacterias Gram negativas y algas eucariotas. Su capacidad para realizar fotosíntesis oxigénica y adaptarse a condiciones extremas las ha convertido en colonizadoras exitosas de ecosistemas acuáticos globales. Sin embargo, las proliferaciones excesivas de cianobacterias, conocidas como floraciones de algas nocivas (HABs), constituyen una preocupación global significativa debido a su impacto negativo en la pesca, la acuicultura y el suministro de agua potable.
Estas floraciones, impulsadas principalmente por la eutrofización debido al exceso de nutrientes de actividades antropogénicas, facilitan la expansión de géneros tóxicos como *Microcystis, Oscillatoria y Planktothrix,* capaces de producir cianotoxinas como microcistinas, saxitoxinas y cilindrospermopsinas y que pueden representar serios riesgos para la salud humana, provocando problemas hepáticos, gastrointestinales, neurológicos, entre otros. La exposición a estas toxinas puede ocurrir a través del contacto dérmico, la inhalación, la ingestión de agua contaminada o alimentos que han estado en contacto con cianobacterias. Estrategias como la reducción de cargas de fósforo y nitrógeno en cuerpos de agua, mediante el control de fuentes agrícolas y urbanas, son esenciales para prevenir futuras floraciones con capacidad de comprometer la salud pública y de los ecosistemas. Además, los análisis espacio-temporales de la distribución y dinámica de cianobacterias, pueden ser cruciales para la predicción y la gestión efectiva de las floraciones.
Este artículo de revisión aborda estos temas y destaca la importancia de políticas de uso seguro del agua y estrategias de mitigación para prevenir problemas relacionados con las floraciones de cianobacterias, protegiendo así la salud pública y la sostenibilidad de los ecosistemas acuáticos

Palabras clave: cianotoxinas, cambio climático, gestión hidrica, salud pública

ABSTRACT

Cyanobacteria, aerobic photosynthesizing microorganisms with an evolutionary history of more than 3.5 billion years, represent a unique fusion between Gram-negative bacteria and eukaryotic algae. Their ability to perform oxygenic photosynthesis and adapt to extreme conditions has made them successful colonizers of global aquatic ecosystems. However, excessive cyanobacterial blooms, known as harmful algal blooms (HABs), are a significant global concern due to their negative impact on fisheries, aquaculture and drinking water supplies.
These blooms, driven mainly by eutrophication due to excess nutrients from anthropogenic activities, facilitate the expansion of toxic genera such as Microcystis, Oscillatoria and Planktothrix, capable of producing cyanotoxins such as microcystins, saxitoxins and cylindrospermopsins, which can pose serious risks to human health, causing liver, gastrointestinal and neurological problems, among others. Exposure to these toxins can occur through dermal contact, inhalation, ingestion of contaminated water or food that has been in contact with cyanobacteria. Strategies such as reducing phosphorus and nitrogen loads in water bodies by controlling agricultural and urban sources are essential to prevent future blooms with the potential to compromise public and ecosystem health. In addition, spatio-temporal analyses of cyanobacterial distribution and dynamics can be crucial for the prediction and effective management of blooms.
This review article addresses these issues and highlights the importance of safe water use policies and mitigation strategies to prevent problems related to cyanobacterial blooms, thus protecting public health and the sustainability of aquatic ecosystems.

KeyWords: cyanotoxins, climate change, water management, public health.

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