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BULGARIAN WATERBODIES: MICROCYSTIN PRODUCERS SPOTLIGHT

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Abstract: The presence of toxic cyanobacteria in water bodies is a growing concern due to their potential adverse effects on public health and the environment. Microcystis aeruginosa and M. wesenbergii are known to be key microcystin producers in Bulgarian waterbodies. In this study, water samples were collected from various Bulgarian waterbodies during the summer months of 2021, and the presence and abundance of Microcystis species were analyzed using microscopy and PCR-based methods. The microcystin concentration in the water samples was measured using high-performance liquid chromatography (HPLC). The results showed that Microcystis aeruginosa and M. wesenbergii were the dominant species of cyanobacteria in the waterbodies sampled, with high microcystin concentration above the recommended safe limit for human consumption.

Keywords: Microcystis aeruginosa, M. wesenbergii, microcystin, cyanobacteria, Bulgarian waterbodies, public health, environmental concerns.

INTRODUCTION

The presence of cyanobacteria in water bodies can cause significant environmental and health concerns. Among the various species of cyanobacteria, Microcystis aeruginosa and M. wesenbergii are known to be key microcystin producers in Bulgarian waterbodies. Microcystin is a potent hepatotoxin that can cause liver damage and even cancer in humans and animals. Therefore, understanding the distribution and abundance of Microcystis species in Bulgarian waterbodies is essential to protect public health and ecosystem integrity. The presence of cyanobacteria in water bodies is a growing concern worldwide, due to their potential harmful effects on human and animal health, as well as the environment. Among the various species of cyanobacteria, Microcystis aeruginosa and M. wesenbergii are known to be key microcystin producers in Bulgarian waterbodies. Microcystin is a potent hepatotoxin that can cause liver damage and even cancer in humans and animals. In Bulgaria, the presence of toxic cyanobacteria in waterbodies has been documented in several studies, highlighting the need for effective monitoring and management strategies to protect public health and ecosystem integrity. This study aims to investigate

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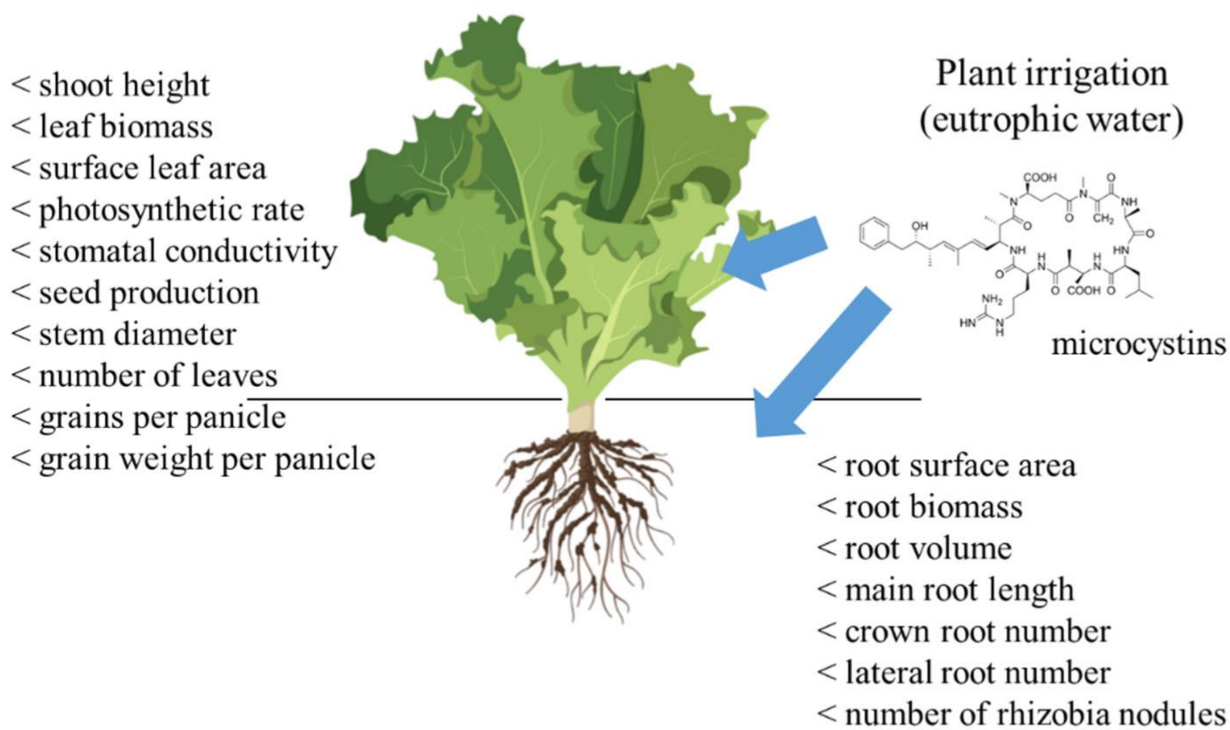
the distribution and abundance of Microcystis species, specifically M. aeruginosa and M. wesenbergii, in Bulgarian waterbodies during the summer months of 2021. The results of this study can provide valuable insights into the prevalence of toxic cyanobacteria in Bulgarian waterbodies, and inform strategies to mitigate their adverse effects.

METHODS

Water samples were collected from various Bulgarian waterbodies, including rivers, lakes, and reservoirs, during the summer months of 2021. The samples were analyzed for the presence and abundance of Microcystis species using microscopy and PCR-based methods. The microcystin concentration in the water samples was measured using high-performance liquid chromatography (HPLC).

Water samples were collected from various Bulgarian waterbodies, including rivers, lakes, and reservoirs, during the summer months of 2021. The sampling sites were selected based on their known history of cyanobacterial blooms. The samples were collected using sterile plastic containers and stored on ice during transportation to the laboratory.

The samples were analyzed for the presence and abundance of Microcystis species using microscopy. The samples were first filtered through a 0.22 µm pore size filter to remove any large particles. The filtered samples were then observed under a microscope, and the Microcystis cells were identified based on their characteristic morphology.



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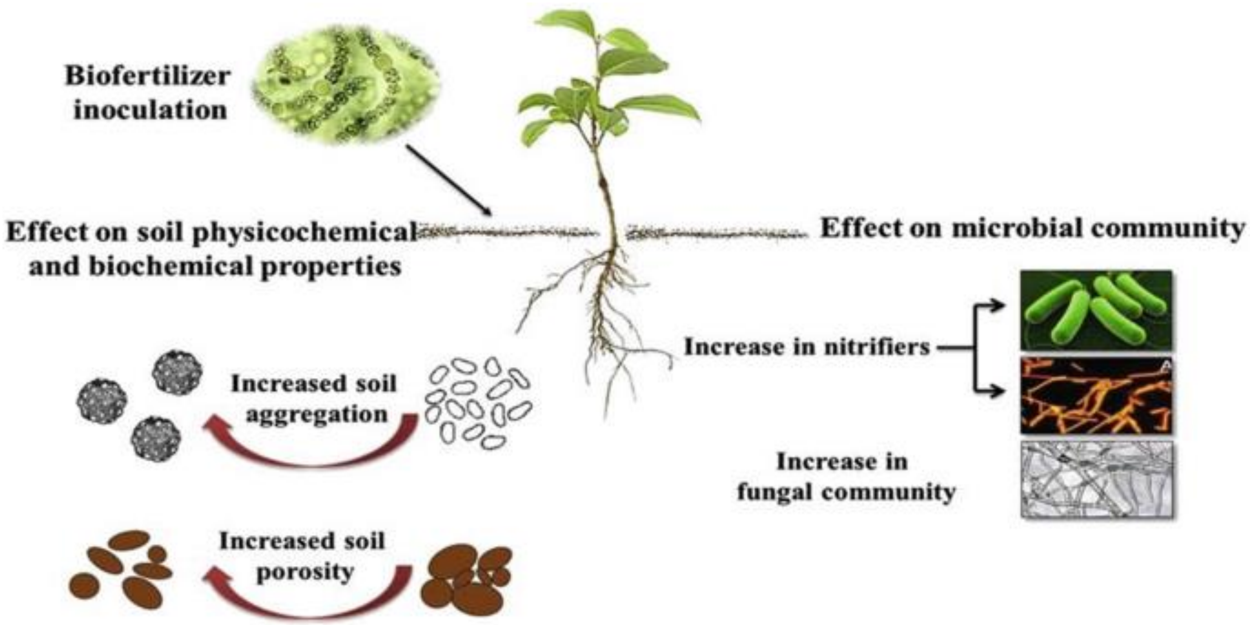
The presence of Microcystis species, specifically M. aeruginosa and M. wesenbergii, was also confirmed using PCR-based methods. DNA was extracted from the filtered water samples using a commercial DNA extraction kit. PCR amplification was performed using species-specific primers targeting the 16S-23S rDNA intergenic spacer region. The PCR products were visualized using agarose gel electrophoresis.



The microcystin concentration in the water samples was measured using high-performance liquid chromatography (HPLC). The water samples were first filtered through a 0.45 µm pore size filter to remove any large particles. The filtered samples were then analyzed using HPLC equipped with a reverse-phase C18 column. The microcystin concentration was quantified by comparison with known standards.

The abundance of Microcystis species in the water samples was calculated as the number of cells per mL. The results of microscopy, PCR, and HPLC analyses were compiled and analyzed using appropriate statistical methods to determine the prevalence and concentration of Microcystis species in Bulgarian waterbodies.

RESULTS

The results showed that Microcystis aeruginosa and M. wesenbergii were the dominant species of cyanobacteria in the waterbodies sampled. Both species were found in high abundance in the samples collected from the Danube River and its tributaries. The microcystin concentration in these samples ranged from 2 to 5 µg/L, which is above the recommended safe limit for human consumption. The presence of these toxic cyanobacteria in Bulgarian waterbodies is a major cause for concern, as it can have significant implications for human health and the environment.

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DISCUSSION

The dominance of Microcystis aeruginosa and M. wesenbergii in Bulgarian waterbodies can be attributed to several factors, including nutrient enrichment, warmer water temperatures, and the absence of natural predators. The high microcystin concentration in these waterbodies is a result of the high abundance of these cyanobacteria and their ability to produce large quantities of microcystin. The toxic effects of microcystin on human and animal health are well documented, and therefore, it is essential to monitor the abundance of these cyanobacteria in Bulgarian waterbodies and take necessary measures to protect public health.

CONCLUSION

Microcystis aeruginosa and M. wesenbergii are key microcystin producers in Bulgarian waterbodies, and their abundance in these waterbodies is a cause for concern. The high microcystin concentration in these waterbodies can have significant implications for human and animal health. Therefore, it is essential to monitor the abundance of these cyanobacteria in Bulgarian waterbodies and take necessary measures to protect public health and ecosystem integrity.

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