

MINI REVIEW article

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This article is part of the Research Topic

Diffuse Agricultural Water Pollution: Nutrient Capture, Recovery, and Recycling Systems

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Risks associated with wastewater reuse in agriculture: investigating the effects of contaminants in soil, plants, and insects

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Risks and Benefits of Wastewater Reuse in Agriculture: A PRIMA-SAFE Perspective

Description

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Risks associated with wastewater reuse in agriculture: investigating the effects of contaminants in soil, plants, and insects



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As part of the work developed within the **PRIMA-SAFE** project, this review article published in *Frontiers in Environmental Science* offers a critical analysis of the **environmental and health risks**

associated with the **reuse of treated wastewater** in agriculture. It highlights both the **nutritional potential** of wastewater and the risks posed by contaminants to soil, plants, insects, and ultimately human health.

Key Findings

- Wastewater irrigation can improve **soil fertility** and **crop yield**, especially for short-cycle crops like lettuce and tomato, and reduce the need for chemical fertilizers.
- However, it may also introduce **organic pollutants, heavy metals, pathogens, pesticides, and pharmaceuticals**, many of which are not completely removed by conventional wastewater treatment.
- These contaminants can **accumulate in the soil and crops**, alter **insect population dynamics**, and potentially **promote the spread of antibiotic resistance**.
- The article emphasizes the presence of **N-nitrosamines**, a class of carcinogens, in wastewater and their potential impact on both ecosystems and human health.
- Strategies to mitigate risks include **advanced tertiary treatments, biological filtration**, and the adoption of **precision irrigation systems** such as drip irrigation to limit direct contact with edible plant parts.

Implications

The authors stress the importance of developing **interdisciplinary approaches** to manage the safe reuse of wastewater in agriculture, combining insights from **environmental science, agronomy, and public health**. Addressing regulatory gaps and investing in **targeted treatment technologies** are key to ensuring long-term sustainability in water-scarce regions.

Reference

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