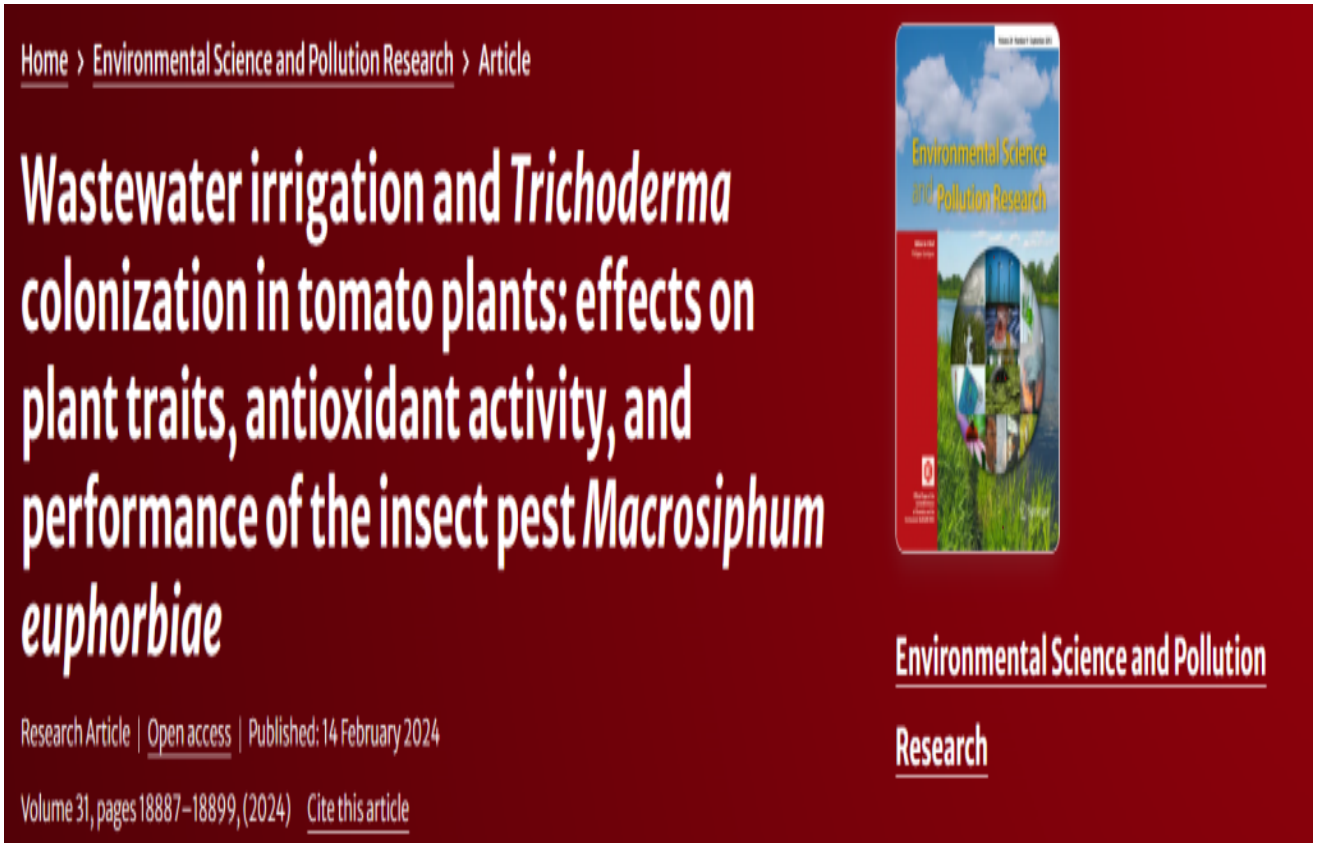
Trichoderma and Wastewater Irrigation: Impacts on Tomato Plant Traits and Aphid Performance

Description



As part of the research conducted within the **PRIMA-SAFE** project, a study published in *Environmental Science and Pollution Research* evaluates the combined effects of **wastewater irrigation** and colonization by **Trichoderma afroharzianum T-22** on tomato plants. The study examines plant growth, antioxidant responses, and the performance of the insect pest *Macrosiphum euphorbiae*.

Key Findings

- **Trichoderma** colonization improved growth and antioxidant activity **only when distilled water** was used for irrigation. In contrast, no positive effects were observed under **saline or wastewater conditions**.
- Under stress conditions (high nitrogen or mixed wastewater), Trichoderma colonization **triggered additional stress responses** in plants, which appeared to **reduce growth and leaf area** rather than mitigate stress.
- Aphids showed **increased fecundity and survival** on colonized plants, particularly under the S3 treatment (mixed wastewater). The fungus seemed to **enhance plant nutritional value**, favoring pest development.
- Antioxidant activities (DPPH, ABTS, FRAP) and the content of polyphenols and flavonoids were influenced by both **water quality and fungal inoculation**, with complex interactions between stress, defense, and plant metabolism.

Implications

This study demonstrates that while **Trichoderma afroharzianum T-22** can act as a beneficial symbiont under optimal conditions, its role becomes ambiguous or even detrimental under environmental stress, such as wastewater salinity. The findings underline the need to carefully evaluate the **interactions between microbial inoculants and irrigation quality** in sustainable agricultural systems.

Reference

Trotta V., Russo D., Rivelli A.R., et al. (2024).
Wastewater irrigation and Trichoderma colonization in tomato plants: effects on plant traits, antioxidant activity, and performance of the insect pest Macrosiphum euphorbiae.
Environmental Science and Pollution Research, 31, 18887–18899.
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Category

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