

Special Issue

Nitrogen Cycling and Efficient Utilization Mechanisms in Agricultural Field Ecosystems

Message from the Guest Editors

Nitrogen (N) underpins crop productivity but is also a primary contributor to agricultural air and water pollution and a major source of nitrous oxide (N₂O). Since the mid-20th century, synthetic fertilizers and intensified livestock systems have expanded the global reactive N pool, improving yields while amplifying losses through ammonia volatilization, nitrate leaching, denitrification, and runoff. Decades of research—from whole-farm N balances and ¹⁵N tracer studies to process-based modeling—have clarified key pathways; yet, spatial and temporal uncertainties persist, especially under climate variability and changing management methods.

This Special Issue seeks integrative science and solutions that (a) advance mechanistic understanding of N cycling from rhizosphere to region, and (b) deliver practical, scalable strategies to boost N efficiency while reducing losses. We welcome the submission of cross-disciplinary work that links soil processes, plant physiology, microbial ecology, agronomy, hydrology, and socio-economic dimensions, with clear implications for farm management and policy. We welcome submissions that are rigorous, transparent, and practically informative.

Guest Editors

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