Science Societies

# Nitrogen Loss Mitigation Has Unintended Effects

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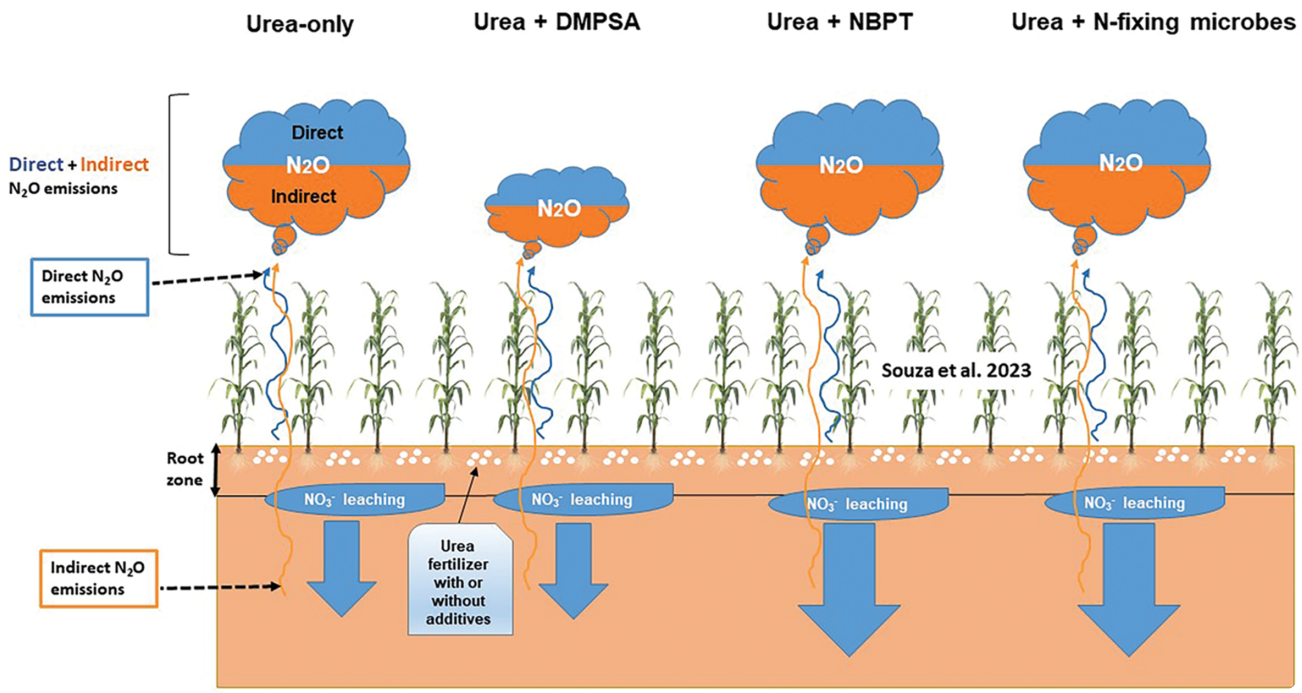


*Application of N-fixing microorganisms and microbial inhibitors had unintended effects on nitrous oxide emissions.*

Corn has a high requirement for nitrogen (N), which is commonly applied as urea fertilizer early in the growing season when the crop has a low demand for N. This practice increases the potential for $N_2O$ emissions to the atmosphere and $NO_3$ leaching to groundwater. Proposed strategies to minimize environmental losses include applying N‐fixing microbes or chemical compounds that inhibit soil processes that promote N losses. However, the combined use of microbes and inhibitors has not been evaluated for corn production.

Researchers compared the individual effects of N‐fixing microbes, the nitrification inhibitor DMPSA, and the urease inhibitor NBPT, as well as the effects of combined DMPSA and NBPT and combined DMPSA and N‐fixing microbes. Agronomic effects were small; DMPSA and microbes increased rainfed corn yield by 11%. Most treatments reduced direct $N_2O$ emissions by 24–77%, but this benefit was counteracted by increased $NO_3$ leaching. In some cases, increased leaching offset the direct $N_2O$ emission reductions such that total direct and indirect $N_2O$ emissions were unchanged compared with a urea‐only treatment.

This study demonstrates that the use of soil additives requires caution and further study to optimize their agronomic and environmental performance.

**Adapted from** Souza, E. F. C., Rosen, C. J., Venterea, R. T., & Tahir, M. (2023). Intended and unintended impacts of nitrogen‐fixing microorganisms and microbial inhibitors on nitrogen losses in contrasting maize cropping systems. *Journal of Environmental Quality*, *52*, 972–983. https://doi.org/10.1002/jeq2.20500