Science Societies

Manure Application Methods Do Not Drive N_2O Emissions in a Hayfield

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Left: Sarah Brickman, a master's student at the University of Vermont, injects a greenhouse gas sample into a glass vial at Borderview Research Farm in Alburgh, VT. Photo by Karin Rand. Right: A Veenhuis Euroject 1200 grassland injector applies manure to a subplot at the farm. Photo by Sarah Brickman.

Manure injection is an alternative manure application method that can reduce nitrogen and phosphorus runoff as well as decrease ammonia emissions. However, compared

with the more typical practice of spreading manure on the soil surface, manure injection has been shown to increase emissions of nitrous oxide (N_2O), a greenhouse gas with a warming potential 273 times that of carbon dioxide, therefore presenting an environmental trade-off.

Because many previous studies of greenhouse gas emissions from manure injection were conducted in annual cropping systems, scientists at the University of Vermont examined whether there would still be elevated N_2O fluxes when injecting manure in a perennial hayfield. In a two-year field trial in Vermont, they found that mean daily N_2O fluxes were comparable in the manure injection and surface manure application treatments. Rather than manure application method, soil moisture was the most important predictor of daily N_2O fluxes, followed by soil inorganic nitrogen and soil temperature. Soil moisture and temperature interacted to produce the largest daily N_2O fluxes when both were relatively high.

These results suggest that injecting manure during dry periods or during wet but cool periods could reduce its climate impacts.

Adapted from

Brickman, S., Darby, H., Ruhl, L., & Adair, E.C. (2024). Nitrous oxide emissions are driven by environmental conditions rather than nitrogen application methods in a perennial hayfield. *Journal of Environmental Quality*. https://doi.org/10.1002/jeq2.20536

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