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THE UNIVERSITY OF VERMONT RUBENSTEIN SCHOOL OF ENVIRONMENT AND NATURAL RESOURCES

GRADUATE STUDENT CLIMATE ADAPTATION PARTNERS (GRADCAP) WEBINAR SERIES

MITIGATING GASEOUS CARBON AND NITROGEN LOSSES FROM NORTHEASTERN AGRICULTURAL SOILS VIA ALTERNATIVE SOIL MANAGEMENT PRACTICES

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Results from a three-year field study showed that manure injection presents a tradeoff between greenhouse gas emissions and nutrient retention. No-till management decreases carbon dioxide emissions and can be implemented without compromising crop yields.

Traditional agricultural practices often result in gaseous losses of nitrous oxide (N_2O) and carbon dioxide (CO_2), representing a net loss of nutrients from agricultural soils. This negatively impacts crop yield and requires farmers to increase nutrient inputs. By adopting best management practices, such as no-till, manure injection, cover cropping, and applying manure at the appropriate time of year, there is great potential to reduce these nutrient losses.

However, adopting a no-till and manure injection system has had setbacks within the Northeast, primarily due to the lack of data regarding nutrient retention paired with crop yields. In this field study, we utilized a no-till and manure injection system with a field trial in Alburgh, VT. It consisted of two tillage treatments (vertical-till and no-till), two manure application treatments (broadcast without incorporation and manure injection), and two manure application seasons (spring and fall). Our results showed that manure injection increased N_2O emissions by 91-136% relative to broadcast application (Figure 1) and vertical-till increased CO_2 emissions by 125-270% relative to no-till **(watch webinar for figures on CO_2 emissions)**. The observed treatments did not have a significant effect on corn yield. Future work will focus on (1) the potential for cover crops to improve the nitrogen use efficiency of these systems, (2) measure ammonia emissions from these treatments, and (3) understand the microbial molecular mechanisms that drive N_2O pulses directly after manure application.

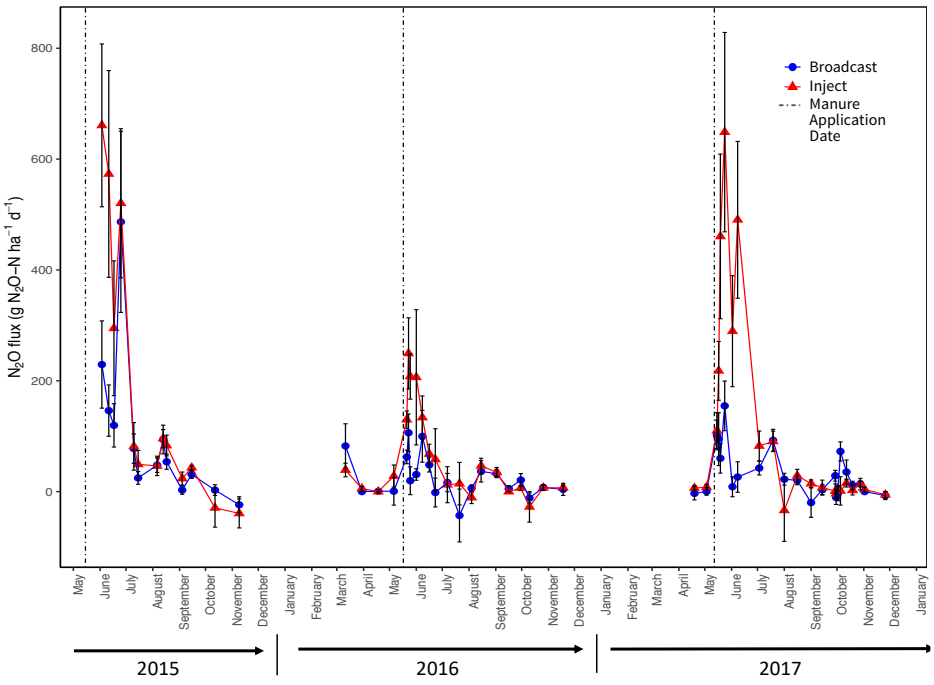

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Photo: Corn field trial in Alburgh, Vermont by Kyle Dittmer | USDA is an equal opportunity provider, employer, and lender