Nitrous Oxide Emissions As Affected By Drainage Design and Management in Corn Based Cropping Systems.

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Introduction

- Subsurface drainage is required to optimize crop production in the Midwest USA.
- The effect of subsurface drainage on nitrate losses is well documented. However, there is little information about the effect on nitrous oxide (N_2O) emissions.

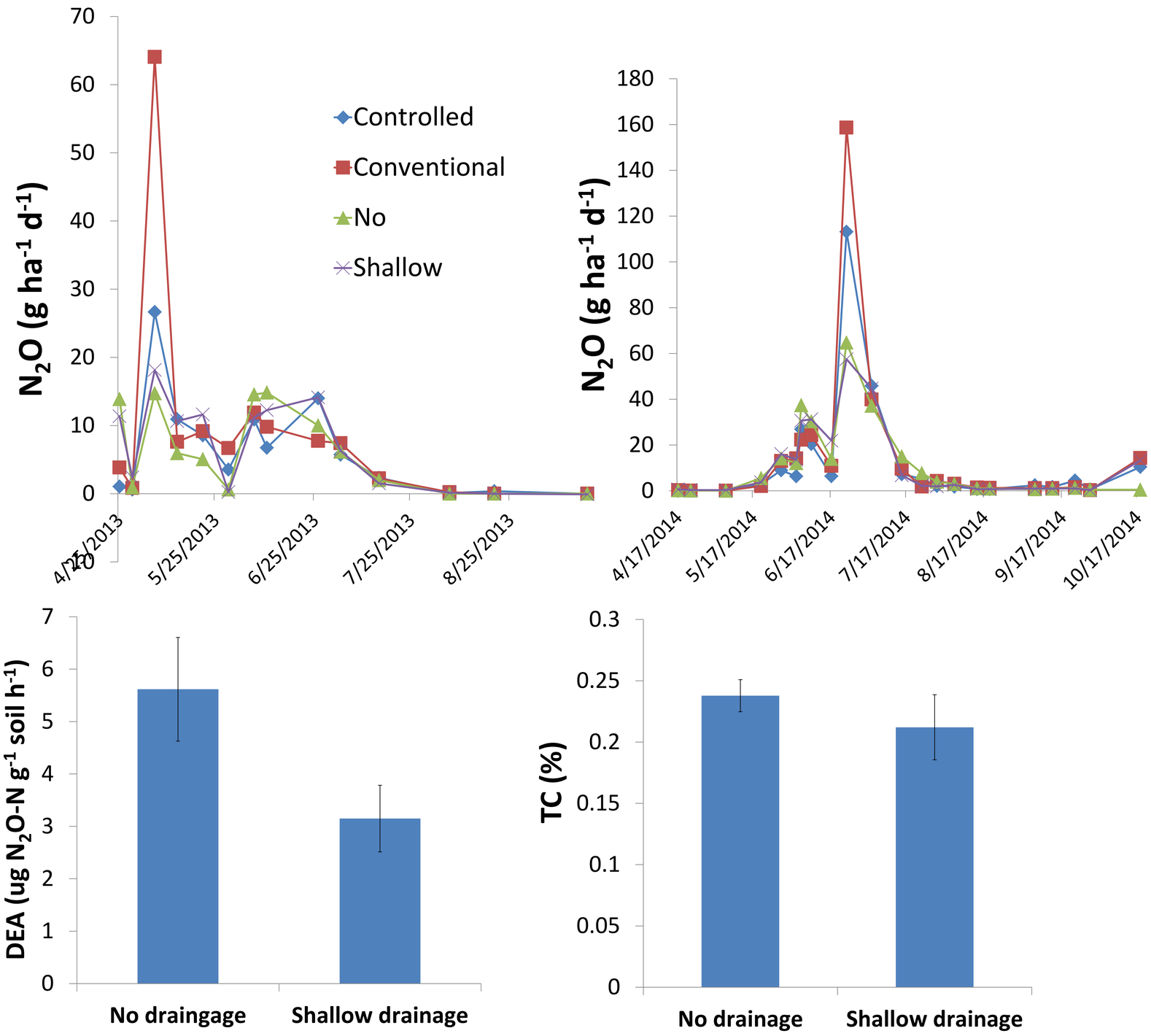
Objectives

- The objectives of this study were to evaluate the response of subsurface drainage on N_2O emissions.

Experimental Procedure

In situ N_2O fluxes were measured across two seasons (2013 and 2014) in continuous corn at following treatments.

- Controlled drainage
- Conventional drainage
- Shallow drainage
- No-drainage plots



- In situ N_2O fluxes did not show a clear pattern across drainage plots in both years.
- Fluxes showed temporal variability across drainage plots during warm summer months (May-July) in both years.
- In the laboratory, denitrification enzyme activity (DEA) was significantly higher in less-drained compared to more drained plots
- The difference in DEA was coincident with higher total carbon concentrations in soils from less-drained sites

Conclusions

- The results suggest drainage may have an effect on N_2O emissions, but our field data indicate that understanding this effect will be difficult.
- Denitrification Enzyme Activity (DEA) coincidence with total carbon suggest possible differences in N_2O/N_2+N_2O ratio.

Recommendations

Due to the high variability in in-situ N_2O fluxes, further laboratory measurements are required to detect any differences in N_2O/N_2+N_2O ratio across sub-surface drainage treatments.

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