Harnessing Plants to Reduce Microbial Greenhouse Gas Emissions

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BACKGROUND

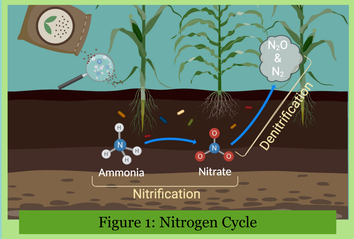
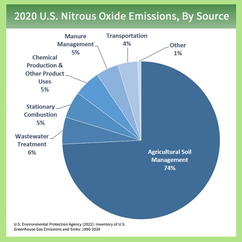


Figure 1: Nitrogen Cycle



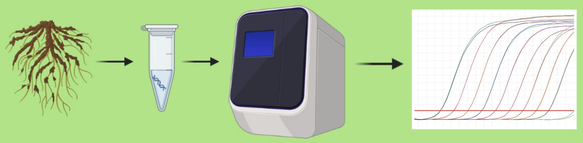
- Nitrogen loss is costly and contributes to greenhouse gas emissions
- Assisted an investigation of both artificial and natural inhibition of nitrogen loss
- Using agricultural practices, can we **reduce the amount of nitrous oxide released by microbes in the soil?**
- Sorghum: natural inhibition of nitrogen loss
- DMPP: artificial inhibition of nitrogen loss

Figure 2: Research field and plot treatment examples

METHODOLOGY

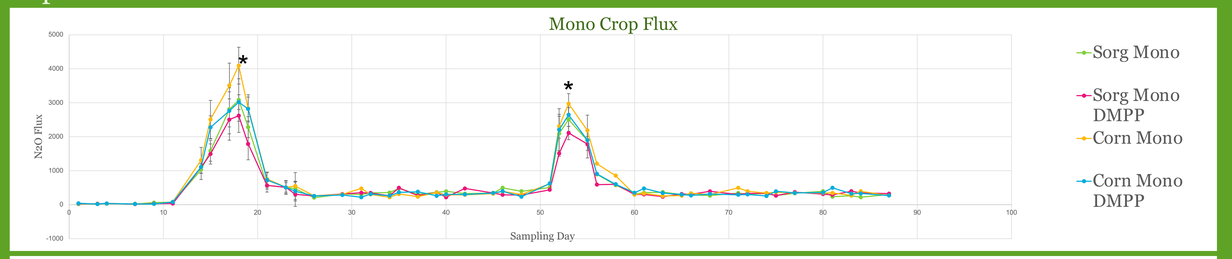
EXPERIMENT 1: Gas Collection and Chromatography

EXPERIMENT 2: Functional gene abundance through qPCR



RESULTS

Experiment 1:



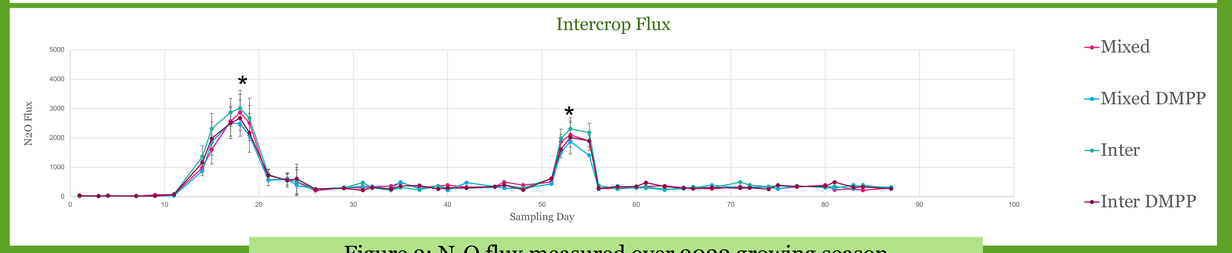
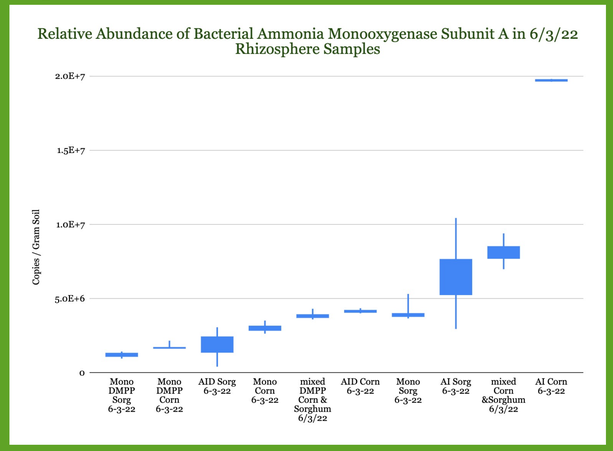
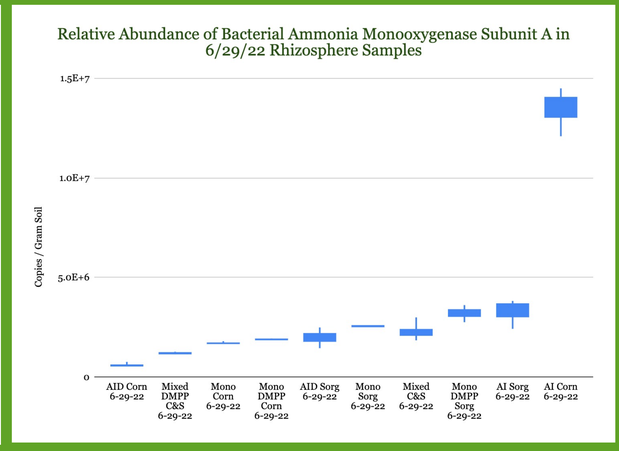
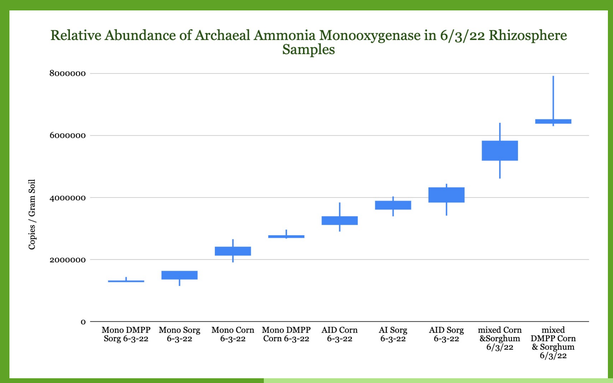


Figure 3: N_2O flux measured over 2022 growing season

Experiment 2:







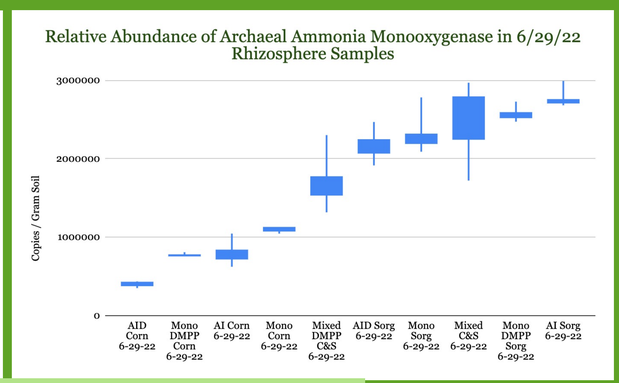


Figure 4: Ammonia Monooxygenase abundance in microbes

CONCLUSIONS

- Artificial and natural inhibition of nitrogen loss work synergistically
- Intercropping reduces the overall N_2O flux
- Reduction of N2O emissions is not directly correlated to gene abundance in microbes

FUTURE RESEARCH

- Exploration of the microbial community in the rhizosphere
- Experimenting with different artificial inhibitors
- BNI mechanism of action
- Effect on large scale agriculture

CAREER IMPACTS

- Gained experience with techniques like qPCR and DNA extraction
- Explored agricultural Microbiology
- Researched independently and balanced multiple tasks

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