Background

Biochar = Charcoal added to soil with the intent of improving it and increasing crop yields[1]

Used in tropical agriculture for millennia[2]
- Increase pH
- Increase cation exchange
- Offer microbial habitat
- Retain moisture
- Reduce erosion[3]

Now investigated in temperate agriculture because of potential to lower GHG emissions

General impacts in Temperate Agriculture
- Decreased GHG emissions[4]
- Initial decreased crop yields[5]
- Unclear ecosystem impacts[6]

Three Treatments
- **MN**: Manure (Poultry) (6t/ha) & Nitrogen fertilizer (urea) (135kg/ha)
- **MB**: Manure (3t/ha) & Biochar (wood source material)(3t/ha)
- **MNB**: Manure (3t/ha), Nitrogen fertilizer (135kg/ha), & Biochar (3t/ha)

Knowledge Gaps
- Whether a temperate application can bypass initial negative impacts
- The soil changes driving emission rates
- How biochar impacts temperate soil ecology

Statistical Analysis
Univariate ANOVA analyses were conducted in conjunction with Tukey’s Post-Hoc HSD test to determine homogeneity of variance and normality. These were used to determine the impact of the three treatments.

Physical soil characteristics were correlated with gas emissions characteristics using two-tailed Pearson correlations. A linear regression was used to determine the relationship between these factors.

All statistical analyses were carried out on SPSS Statistics for Windows Version 23.0 (IBM Corp., 2015). P<0.05 was the significance threshold for all analyses.

Results

Soil Characteristics

Three Treatments
- MN: Manure (Poultry) (6t/ha) & Nitrogen fertilizer (urea) (135kg/ha)
- MB: Manure (3t/ha) & Biochar (wood source material)(3t/ha)
- MNB: Manure (3t/ha), Nitrogen fertilizer (135kg/ha), & Biochar (3t/ha)

Crop Yields

Ecology

Greenhouse Gases

Conclusions

- Stable yield and emissions levels achieved
- Complex interactions impacting crop growth, microbial activity and ecosystem health
- Expected improved outcomes within 5 years

References

5. Hoc HSD test to determine homogeneity of variance and normality. These were performed using IBM SPSS Statistics 23.0 (IBM Corp., 2013).