

Does Biochar reduce ammonia emissions from different amendments to agricultural soil?



Pinto, R M S¹, Fonseca A R¹, Sas-Paszt L², Cordovil, C M d S¹

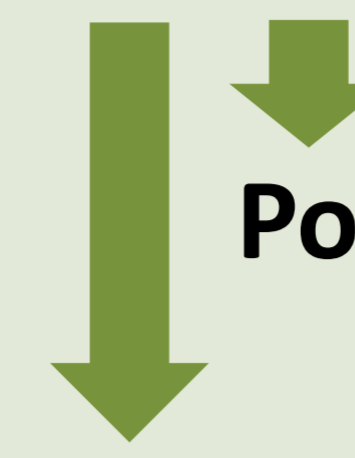
¹ Universidade de Lisboa, Instituto Superior de Agronomia, Tapada da Ajuda, 1349-017 Lisboa, Portugal

² Research Institute of Horticulture, Pomologiczna 18, 96-100 Skierniewice, Poland

Introduction

- Atmospheric ammonia (NH₃) is a key air pollutant effecting eutrophication and acidification of ecosystems
- Agricultural systems are pointed out as the main anthropogenic source of atmospheric NH₃

- Biochar can efficiently adsorb NH₃ and stimulate NO₃ losses mitigation



Potential reduction of NH₃ losses by volatilization

Potential reduction of NO₃ by leaching



Objective

Evaluate the effect of biochar application to soils with different background uses on N sequestration

N fertilizer use Animal production Manure spreading

Methods

- Two different soils with different farming practices (0-20 cm layer)
- 6 treatments performed on each soil type
- ✓ Control unamended soils (CM, CO)
- ✓ Biochar at 5% (B5) and 10% (B10) rates
- ✓ Urea (U) or compost (O) (170 kg N ha⁻¹)
- ✓ Urea + Biochar at 5% and 10% rates (UB5, UB10)
- ✓ Compost + Biochar at 5% and 10% rates (OB5, OB10)

Mixed farming system (M)

Organic farming system (O)



- NH₃ emissions measured from soil and amendment mixtures



- 5 sampling dates (days)

T1 = 2 d | T2 = 4 d | T3 = 7 d | T4 = 9 d | T5 = 11 d

Results

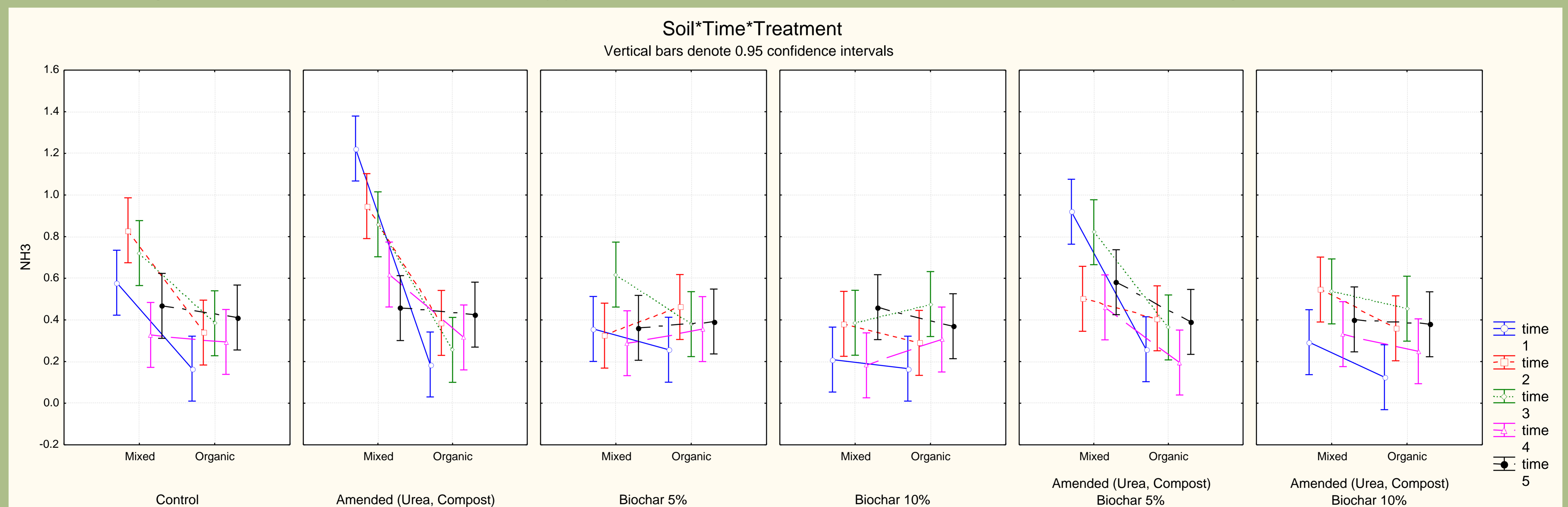
Ammonia volatilization decrease

Between CM and B5 (T1 - 38% and T2 - 61%)
B10 (T1 - 64%, T2 - 54% and T3 - 46%)

Between U and UB5 (for T1 - 25% and T2 - 47%)
UB10 (T1 - 76%, T2 - 43%, T3 - 37% and T4 - 46%)

Biochar application at both rates to M soil significantly decrease ammonia volatilization, compared to control

No significant effect of biochar application was observed in treatments when Organic soil was used



Conclusions

- ✓ Agricultural soils are a major source of NH₃, which can be lost by volatilization following the application of organic and chemical fertilizers
- ✓ Such losses must be prevented to mitigate climate change and reduce economic losses for farmers
- ✓ Biochar can be applied to soil to improve soil fertility (N input) and has potential to be a mitigation agent for environmentally N losses (climate change mitigation)