Impacts of biochar on nitrous oxide emissions and ammonia volatilisation in wheat and maize cropping systems

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Biochar as a soil amendment to reduce N_2O and NH_3

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- Fertilizer application in agricultural systems are responsible for the majority of anthropogenic N_2O and NH_3 emissions.

- Severe negative impacts on the environment:
  - →Greenhouse gas effect (N_2O)
  - →Ozone depletion (N_2O)
  - →Formation of fine particulate matter $PM_{2.5}$ (NH_3)
  - →Eutrophication of aquatic and terrestrial ecosystems (NH_3)
  - →Soil acidification (NH_3)

- Biochar as a soil amendment to reduce N_2O and NH_3 emissions

Simple and efficient methods to measure N_2O and NH_3 in the field

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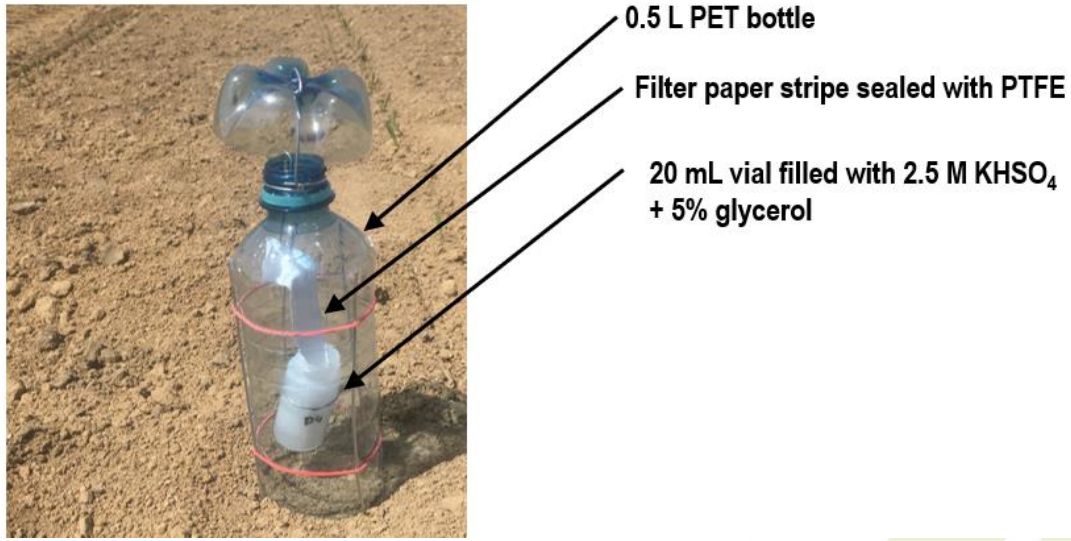
N_2O

Closed static chamber

- Incubation for 20 min
- Sampling of 200 mL
- Analysis with laser technology

NH_3



Semi-open static chamber

- Incubation for 7 days
- NH_3 is trapped with an acid-immersed filter paper stripe covered with PTFE

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Results from a Field Experiment

- Biochar substantially decreases N_2O emissions and NH_3 volatilisation
- There are several mechanisms reported which can reduce N_2O emissions; in our case we pose, that the **immobilisation of NO_3^-/NH_4^+** and an **increased $N_2O \rightarrow N_2$ rate** are responsible.
- **NH_3 volatilisation** was reduced by the N immobilisation effect of biochar, which outweighs an acceleration of NH_3 volatilisation induced by a pH increase.
- Biochar **as a suitable soil amendment to reduce N_2O and NH_3 emissions** in fertilised agricultural systems.