



Biochar's effect on soil nitrous oxide emissions from a maize field with lime adjusted pH treatment

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Biochar is a carbon-rich, porous product from pyrolysis of organic residues. Especially tropical soils have shown positive response in yield to biochar addition. Its high stability in soil makes biochar a potent carbon sequestration option at the same time. A number of laboratory incubations have shown significantly reduced nitrous oxide (N₂O) emissions from soil when mixed with biochar. Emission measurements from the field show the same trend but are much more scarce. One of the hypothesized mechanisms for reduced N₂O emissions from soil is owing to the increase in soil pH from the application of alkaline biochar. To test the effect of biochar on N₂O emissions from a temperate maize system, we set up a field trial with a 20 t/ha biochar treatment, a limestone treatment adjusted to the same pH as with biochar and a control without addition. An automated static chamber greenhouse gas measurement system measured N₂O emissions for each replicated (n=3) every 3.6 hours. The field was conventionally fertilised at a rate of 160 kg-N/ha in 3 doses of 40, 80 and 40 kg-N/ha.

Cumulative emissions show a significant reduction for N₂O in the biochar treatment by about 55 % relative to the control. The limed treatment shows similar emissions than control but with higher variability. This suggests that the N₂O reduction effect of biochar is not mainly due to its liming effect. In conclusion, we confirm that biochar is a promising material to reduce N₂O emissions from intensively managed agricultural soils.