Effect of nitrification inhibitors and soil pH on N_2O emissions

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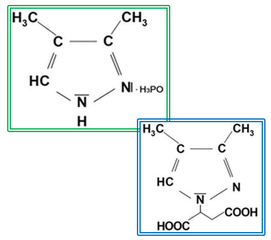
Agricultural soils are becoming acidic worldwide in intensive farming systems due to high application rates of N fertilizers. This acidification is a major agricultural problem since limits several crops yield. On the other hand, soil pH affects nitrification and denitrification processes, consequently affecting the N_2O fluxes derived from both processes.

Homogenized soil

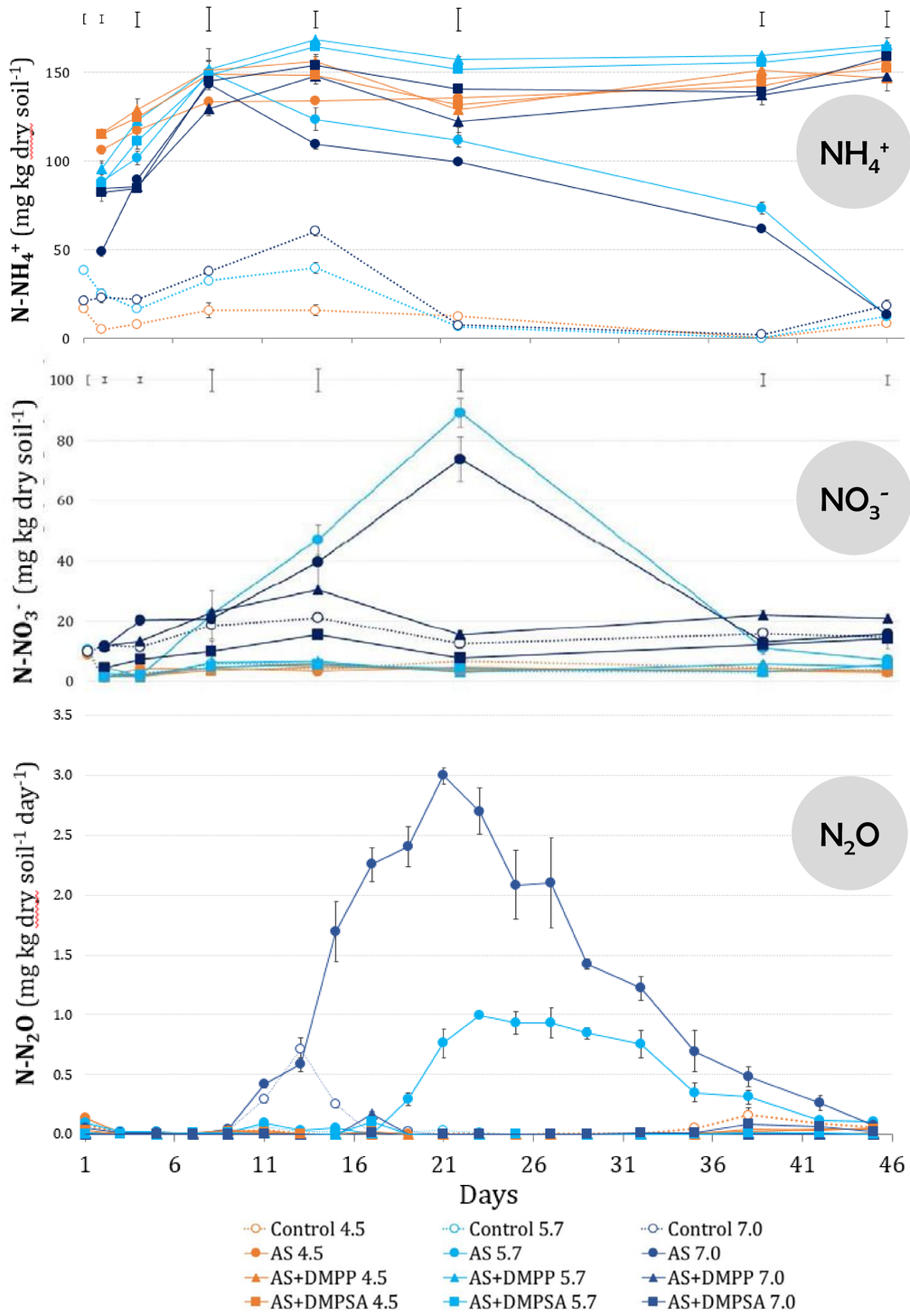
Soil pH conditions: 4.5, 5.7, 7.0

N fertilization (100 kg N ha^{-1}):

- Control
- SA (ammonium sulphate 21%)
- Dimethylpyrazole-Based Nitrification Inhibitors (NIs):
  - SA+DMPP
  - SA+DMPSA



A total of 12 treatments were assayed resulting from the combination of 3 different soil pH and 4 different N fertilizer treatments. Soil was incubated in darkness at 21 °C during 45 days at a water filled pore space of 75%. N_2O emissions were measured every two days after incubating the soils during 60 minutes. Gas samples were analyzed by gas chromatography and soil N-NH_4^+ and N-NO_3^- contents were determined by spectrophotometry.



- The application of fertilizer did not induce N_2O emissions in soil with pH 4.5, where emissions were 19 and 57 times lower than in pH 5.7 and pH 7.0, respectively. These low emissions were attributed to the effect of acidity on nitrification (de Boer and Kowalchuk, 2001).

- When soil pH was 5.7 and 7.0, both nitrification and denitrification should be contributing to N_2O emissions. In this case, both NIs reduced the transformation of soil N-NH_4^+ to N-NO_3^-, showing efficiencies higher than 98% mitigating N_2O emissions from fertilization.

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