

Impact of nitrification inhibitor with organic manure and urea on nitrogen dynamics and N₂O emission in acid sulphate soil

ABSTRACT

The accurate prediction of N transformation is an important requisite for optimizing N use efficiency in cropping systems. An incubation study was conducted to verify the impacts of nitrification inhibitor (NI) with organic manure (OM) and urea on N dynamics and N₂O emission in acid sulphate soil. The conducted experiment was two-level factorial with 4 N sources (N1 = 100% of N from urea, N2 = 75% of N from urea + 25% N from rice straw, N3 = 75% of N from urea + 25% of N from cow dung and N4 = 75% of N from urea + 25% of N from poultry dung) and two levels of NI (with and without DCD). The NI (Dicyandiamide - DCD) with OM + urea enhanced mineral N contents and it was the highest (255.07 µg g⁻¹) for urea with DCD applications. The highest net N-mineralization (213.07 µg g⁻¹) was recorded for the application of urea with DCD and net nitrification (16.26 µg g⁻¹) was recorded for the application of urea alone, but the highest cumulative N₂O emission (5.46 µg g⁻¹) was in urea + poultry dung (PD). In addition, DCD most effectively inhibited net nitrification (28.78%) and N₂O emission (32.40%) from cow dung (CD) and urea in the tested soils. The combination of DCD with CD and urea was more effective in reducing N₂O emissions (43.69%). These results suggest that the DCD with CD and urea may be the most potential combination to reduce nitrification and N₂O emission as well as N loss from acid sulphate soil.

Keyword: DCD; OM; Urea; Mineral N; Net N-mineralization; Net nitrification; N₂O emission