

Gaseous nitrogen losses from tropical soils with liquid or granular urea fertilizer application

ABSTRACT

Gaseous loss of N leads to lower nitrogen use efficiency (NUE) of applied urea and N content of the soil. This laboratory study was conducted to compare the nitrogen losses from two tropical soil series (Bungor sandy clay loam and Selangor clay) incubated with either liquid urea (LU) or granular urea (GU) at 0, 300, 400, or 500 mg/kg of soil for thirty days. The NH₃ volatilization, N₂O emission, and N content in the soils were measured throughout the incubation period. For the same application rate, the total NH₃ volatilization loss was higher in GU-treated soils than the LU-treated soils. NH₃ volatilization loss continued up to the 15th day in the Selangor soil, while in the Bungor soil series it continued up to the 26th day. Higher amounts of N₂O emissions were recorded in GU-treated soils than the LU-treated soils, and N₂O emission increased with increasing rate of GU and LU applications in both soils. The N₂O emission was higher only in the first few days and then tapered off at the seventh and eighth day in Bungor and Selangor soil series, respectively. The total N₂O emission was higher in the Selangor soil series than that of Bungor soil series. The total N content that remained in the LU-treated soils after 30 days of incubation was higher than the GU-treated soils. The total N loss from applied urea was higher in the sandy clay loam Bungor soils than that of clayey Selangor soil series. The results suggest that the LU may be a better N fertilizer source than GU due to lower N loss from NH₃ volatilization and N₂O emission.

Keyword: Granular urea; Liquid urea; Nitrogen use efficiency; Selangor series; Bungor series; Agronomic efficiency