

Mineralization of Inorganic Nitrogen in Saline Soils Enriched with Plant Residue

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Abstract

Releasing pattern of nitrogen and other nutrients from plant residues is a matter of highly concerned as it is important in managing nutrients to maximize the crop productivity of a given soil. Therefore, this study was carried out to examine the releasing pattern of inorganic nitrogen ($\text{NH}_4^+\text{-N}$ and $\text{NO}_3^-\text{-N}$) in a saline soil amended with plant residues of three different species. A factorial combination of two soil types (normal and saline soil) enriched with three types of plant leaves (*Sesbania*, *Caliandra* and *Gliricidia*) and soil sample without any leaf material with four replicate were used in the laboratory incubation. Nitrogen mineralization of soil was determined up to 70 days after treating with plant leaves. Data were statistically analyzed using SAS package. The amount of $\text{NH}_4^+\text{-N}$ released was varied depending on the plant species and no treatment was found to be significant. *Sesbania* leaves treated soil showed the highest and rapid release of nitrogen, followed by *Gliricidia* and *Caliandra*. The ammonification process reached to the maximum at 7, 21 and 28 of incubation respectively in *Caliandra*, *Gliricidia* and *Sesbania* treated soils. Thereafter the nitrification process dominant and $\text{NH}_4^+\text{-N}$ was found converting to $\text{NO}_3^-\text{-N}$. However, saline soil showed significantly low $\text{NH}_4^+\text{-N}$ and $\text{NO}_3^-\text{-N}$ contents compared to normal soil. Meanwhile nitrogen mineralization indicated that leaves of *Caliandra* which has low nitrogen content (3.85 %) was unable to provide available nitrogen in short term. Soil pH and EC of all treatments were highly varied throughout the incubation period. The salinity caused reductions in nitrogen mineralization and total mineralized nitrogen in the soil. The quality of nitrogen constituents in plant materials seemed to play a vital role in the nitrogen mineralization in the saline environment.

Keywords: incubation, nitrogen mineralization, plant residues, salinity