



Nitrogen Mineralization Dynamics in an Ultisol of Sri Lanka with Two Different Organic Amendments and a Microbial Inoculant

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Abstract

Organic amendments can be used in sustainable soil fertility management. These amendments are profoundly affected by different microorganisms, which help to convert nutritionally important elements such as nitrogen (N) and phosphorus (P). In agricultural lands the N availability is often limited. Hence, it is important to introduce microbial inoculum with organic amendments as these are mineralized by microorganisms to release N. This study was conducted to understand the N mineralization dynamics in soil after adding different organic amendments and a microbial inoculant which was prepared using cow dung. Two organic amendments were used with and without microbial inoculant. To compare the results urea was used as a treatment. A soil classified as the order Ultisol and a red yellow podzolic soil which was collected from the Faculty of Agriculture, University of Ruhuna. The air-dried and sieved soil was pre-incubated in 60% of the field capacity for 2 weeks before implementing the treatments. Eight treatments were tested with the mixing rates of compost 10 t/ha with and without inoculum, *Gliricidia sapium* 5 t/ha with and without inoculum, and urea 100 kg/ha with and without inoculum. The microbial inoculant was used at the rate of 500 L/ha for each treatment. The control soil was incubated without incorporating any amendments or inoculum. Statistical analysis was done using SAS package. The N mineralization of each treatment was determined by analysing $\text{NH}_4^+\text{-N}$ and $\text{NO}_3\text{-N}$ during 2, 5, 7, 14, 21 and 36 days after incubation in a laboratory study. The highest total mineral nitrogen was released from *Gliricidia* amended soil ($37.6 \text{ mg N kg}^{-1}$) during the 36 days of incubation, while control soil released the lowest amount of total mineral nitrogen. The total mineral nitrogen increased with time in soils irrespective of the treatment except during the 5th day and 14th day of incubation. The highest net mineralization has occurred during 14 days of incubation in all the treatments, with the highest value reported in *Gliricidia* amended soil without microbial inoculum. Differences in N mineralization was attributed to the differences in characteristics and composition of the amendments added. Further field experiments are required to confirm the results of the above laboratory incubation study as in field conditions, micro-organisms may change mineralization according to other field factors.

Key words: incubation, inoculant, N mineralization, organic amendments, soil organic matter

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