

(05)

Carbon and Nitrogen Mineralisation of Different Soil Amendments in Ultisols

Amarasinghe S.R.*, Premanatha K.P.S.D., Wanniarachchi S.D.

Department of Soil Science, Faculty of Agriculture, University of Ruhuna, Sri Lanka

*rajika@soil.ruh.ac.lk

Abstract

Plants die and decompose through a complex process involving microorganisms such as fungi, bacteria and actinomycetes. In this process many nutrients are released to soil and plants can uptake them for their growth. It is vital to investigate the mineralisation of organic matter and the pattern of release of carbon and nitrogen to the soil. Therefore, this research study was conducted by an incubation study incorporating different soil amendments with surface Ultisols. The objective of the present study is to study the Carbon and Nitrogen mineralisation and the release pattern of nutrients with the time. The study was conducted at the soil science laboratory of Faculty of Agriculture, University of Ruhuna, Mapalana, Kamburupitiya. Two hundred and fifty glass bottles with 100 g of soil were prepared and pre incubated for 2 weeks prior to the application of treatment. Then a calculated amount of each treatment according to their application rate was incorporated and thoroughly mixed with soil. The seven treatments were arranged in a Completely Randomized Design with four replicates; 10 T/ha level of leaf litter compost+soil (CS), soil+10 T/ha level of *Gliricidia sepium* (GS)+soil, 100 kg/ha Urea (US)+soil, 10 T/ha level of Siam weed (*Chromolaena odorata*)+soil (SWS), 10 T/ha cattle manure+soil (CMS) and 10 T/ha spent poultry litter+soil (PLS) and the control soil (S). The moisture content was adjusted to 60% of the field capacity by adding distilled water. The samples were analysed for $\text{NH}_4^+\text{-N}$, $\text{NO}_3^-\text{-N}$, pH, microbial activity in each mixtures in 1, 3, 5, 7, 14, 21, 28, 35, and 42 days after adding the soil amendments. The microbial activity was measured using carbon dioxide evolution. Alkali traps of 1M NaOH and distilled water tube were kept inside the bottle and after the incubation period it was titrated with 0.1M HCl. The statistical analysis was done using SPSS software. The results revealed that nitrogen mineralisation pattern was varied among the treatments. Poultry litter and the *G. sepium* amended soil reported the highest and rapid release of nitrogen. Cattle manure and compost amended soil had the highest value of microbial activity which showed the peak CO_2 evolution. pH value of the different treatments were increased gradually over time with highest pH value in the compost amended soil. The highest phosphorus mineralisation was observed in day 3 and thereafter it decreased significantly. The cattle manure and poultry litter amended soils observed the highest available phosphorus after day 7 of the incubation. Further, it revealed that the variation of mineralisation was effected by the C:N ratio of the different soil amendments.

Key words: Carbon, Incubation, Mineralisation, Nitrogen, Siam weed