

## IMPACT OF ORGANIC AMENDMENTS AND MICROBIAL INOCULANTS ON CARBON MINERALIZATION IN SURFACE ULTISOLS

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Application of organic fertilizers enhances the soil fertility for sustainable cultivation. Further, soil micro-organisms act as the driving force for soil nutrient releasing processes. However, little information is available on the relative effect of the addition of organic matter versus addition of micro-organisms in explaining the effects of organic amendments. Thus, it is vital to understand the impact of organic amendments, and microbial inoculants on soil reactions by measuring the carbon mineralization rates, as it is a means to determine biological soil fertility. An incubation experiment was conducted for ten weeks to identify carbon mineralization of potential organic amendments and microbial inoculants that might improve the quality of acidic soils (Ultisols) in the Department of Soil Science, University of Ruhuna, Sri Lanka. The main objective of this study was to quantify the carbon mineralization rates of organic matter and inoculants amended soils. Carbon dioxide (CO<sub>2</sub>-C) evolution was determined using alkali traps of 1 M NaOH with 0.1 M HCl titration. Surface Ultisols from a Mahogani land was collected and pre-incubated for two weeks prior to the treatments. Eight treatments were compared with each other with four replicates; (i) control soil (S), (ii) soil + 10 T/ha level of compost (SC), (iii) soil + 10 T/ha level of compost + 500 L/ha level of inoculants (SCI), (iv) soil + 5 T/ha level of green manure (SG) (v) soil + 5 T/ha level of green manure + 500 L/ha level of inoculants (SGI) (vi) Soil + 100 kg/ha Urea (SU) (vii) Soil + 100 kg/ha Urea + 500 L/ha level of inoculants (SUI) and (viii) Soil + 500 L/ha level of inoculants (SI). Each amendment in the above mentioned rates was uniformly incorporated with 100 g of soil. Distilled water was used to bring all the soils to 60% of the field capacity, and adjusted weekly by measuring the sample bottles. Each sub-sample bottle was kept in a sealed container and randomized, and then incubated in the dark for 63 days. Sampling was done on days 3, 6, 8, 14, 21, 28, 36, 44, 51 and 63 to identify carbon mineralization of all the treatments. The statistical analysis was done using SAS package. The analytical results revealed that CO<sub>2</sub>-C evolution rates from the soils with added amendments showed significant variation ( $p < 0.0001$ ) between treatments at 3 and 6 days of incubation. The CO<sub>2</sub>-C evolution rates from the soils treated with various amendments increased at the initial stage, and all the treatments showed maximum average value at the 8 day of incubation. The average values of CO<sub>2</sub>-C evolution rates were decreased thereafter. The added soil amendments regulated the CO<sub>2</sub>-C evolution rates, with SUI > SU > SCI > SC > SG > SGI. Further studies are needed to check the different C/N ratios of soil amendments and rates of microbial inoculums.

**Keywords:** Carbon mineralization, Incubation, Microbial inoculants, Ultisols.