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Study on microbial respiration during reclamaition of a calcareous saline-sodic soil

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Soil salinity and sodicity occur extensively in arid and semiarid regions of the world. The depressive influence of salinity and sodicity on soil physical, chemical and plant growth has been documented, while their effect on soil microbial processes have remained relatively unstudied. A laboratory experiment was conducted using soil column to investigate the effect of some amendments on soil microbial respiration during leaching process of a calcareous saline- sodic soil. The treatments were consisted of control (untreated), rutted cattle manure (50 g/kg), rutted pistachio residue (50 g/kg), gypsum (5.2 g/kg; equivalent of gypsum requirement) and their combinations, which were applied once in the beginning of the experiments. An intermittent irrigation method was performed in 120 days period after one month incubation. To reflect the natural conditions the respiration was measured directly in soil columns by CO2 trapped in the NaOH at different time intervals. The results indicated that for all treatments, cumulative C-CO2 increased with time approaching to a steady state amounts at the end of experiment. The final values of cumulative C-CO2 were 326, 324, 1023 and 1419 mg/kg for control, gypsum, pistachio residue and cattle manure, respectively. Addition of organic matter to the soil resulted in higher C-CO2 release. However, the respiration rate due to cattle manure application found to be higher than that of the pistachio residue. The untreated and gypsum treated soils showed the least rates of respiration, similarly. In comparison with organic matter, incorporation of gypsum had no significant effect on soil respiration. The finding of this study reveals that in calcareous saline- sodic soils application of gypsum has no influence on microbial respiration while, addition of organic matter enhances carbon mineralization.