

# Biosolids application enhances soil carbon sequestration: A Meta-Analysis

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Land application of biosolids has been identified as one of the strategies to the soil carbon sequestration, thereby regarded as a potential “direct action” tool in mitigating climate change. However, most of the short- and long-term studies as influenced by land application of biosolids have been shown quite inconsistent results in carbon increments in soils. This study presents a comprehensive Meta-Analysis (MA) on soil carbon sequestration as influenced by biosolids application. Datasets comprised with 175 independent paired-treatments across 25 countries were fed in to Comprehensive Meta-Analysis (version 3) programme. The MA compared Soil Organic Carbon (SOC as g/kg), Microbial Biomass Carbon (MBC as g/kg), Organic Matter (OM as %) and Soil Carbon Storage (SCS as Mg/ha) changes over three categories comprised within fourteen groups: application age (time after application) as <1, 1-3, 3-5, 5-8, 8-11, >11 year, cumulative application rate as <1-50, 51-100, 101-150, 151-200, 201-250, >251 tonnes/ha and soil depth (carbon storage as a function of soil depth) as 0-15, 15-30, 30-45, 45-60 cm. The random model is applied to explicate overall effects of analysed data derived from the MA.

The MA showed overall positive influences of biosolid application on soil carbon sequestration towards increasing SOC, MBC and OM. For example, the highest effect on soil OM was observed at 8-11 age group suggesting the need of long term biosolids application to promote carbon storage in soils. Short terms (<1, 1-3 and 3-5 year groups) applications of biosolids resulted in lower amount of OM contents. Overall, this study shows that land application of biosolids can be used to increase soil carbon storage and therefore has the potential to be a strategy for mitigating climate change.