



Soil macro invertebrates enhance C storage in tropical soils following application of the FBO technology

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We evaluated the potential of the FBO (Fertilisation Bio Organique ®) technology to store carbon provided in the form of organic fertilizer in a Colombian plantain banana plantation. FBO is a nucleation technique which consists in planting perennial plants in 1.0 x 0.4 x 0.4 m deep trenches where low- and high-quality organic materials are added in a specific design and endogeic earthworms are inoculated. In the experimental setup, the two sources of organic materials were either separated (T1) or mixed (T2). We postulated that earthworm feeding activities would stimulate cast production, with casts likely to be further stabilized as large soil macro aggregates, within which organic matter would be physically protected from decomposition and mineralization. Total macroinvertebrate population densities increased more than twofold between the control and the FBO treatments, with especially high increases in populations of Isopoda (+493 to +762%), Diplopoda (+698 to +877%) and endogeic earthworms (+457 to +622%). Soil macro aggregation was greatly enhanced in the FBO treatments with spectacular increases in the percentages of large >1cm (+48.2%), medium 0.5 to 1 cm (+65.7%), and small < 0.5 cm (+212.5%) biogenic macro aggregates at expenses of the physical aggregates and residual soils that were almost absent. The organic matter content of aggregates was lowest in physical and large biogenic aggregates, intermediate in medium sized macro aggregates and maximal in residual soils and small macro aggregates. Depth and treatments also affected marginally these values. On a hectare scale and to a depth of 30 cm, the organic matter stored in the FBO treatments represented between 1.07 and 4.5‰ of the total initial stock of organic matter. Respirometric activity declined by half in the large and medium sized macro aggregates compared with the residual soil. Our results illustrate the substantial effect of macroinvertebrate activities on the progressive incorporation of organic residues into a succession of macro aggregate structures, within which they are significantly protected from mineralization.



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Kg OM m⁻²

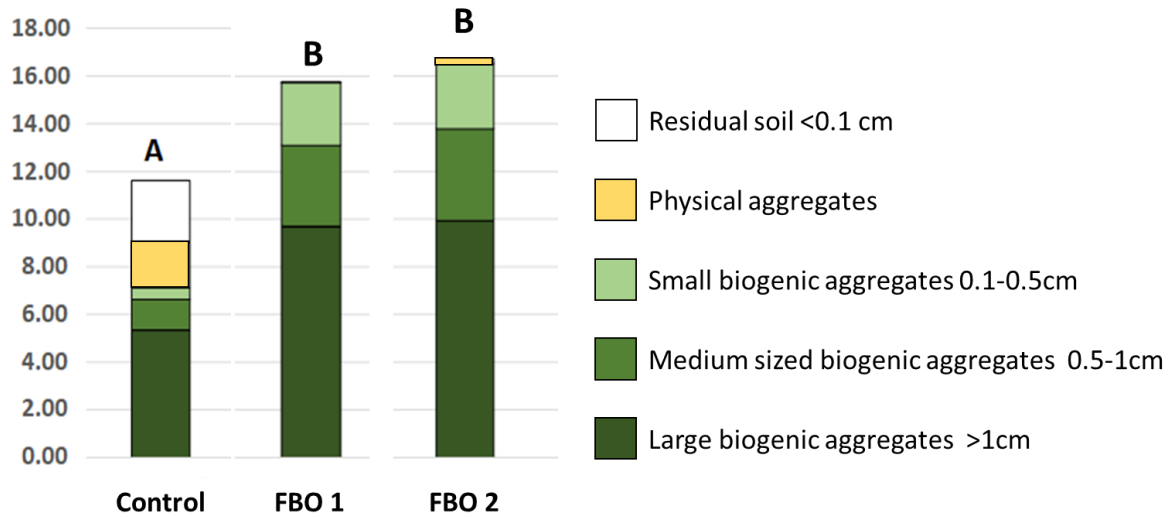


FIGURE 1: Accumulation of organic matter in macro aggregated fractions and residual soil (kg m⁻²) in control and the two FBO treatments.