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Evaluation of compost application on soil organic carbon sequestration and physic-chemical properties in olive grove agroecosystems of NE Portugal

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Abstract

Global carbon (C) cycle and atmosphere pollution remediation depended directly on C terrestrial sequestration and storage. In this context, soil organic carbon (SOC) plays an extremely important role by creating and enlarging C pools, such as organic amendments input over croplands. The present research aims to evaluate the outcomes from three types of compost (A, B and C) to a Leptosol, in an olive grove (NE Portugal) and its relationship with soil physic-chemical properties. The compost production is derived from an agroindustry by-product, namely olive pomace mixed with sheep manure and almond shell in different proportions. Preview studies showed no significant difference for SOC concentration on top layer soil (0-5 cm) for different dosage (10 and 40 ton ha^{-1}) after 1 year application. The olive grove conservative management also presented no significant difference of SOC concentration among spatial distribution (elevation, x and y coordinates), which means there is practically no soil loss in 15% slope. Furthermore, the soil ΔpH (from KCl to H_2O) presented variable charge of 1.21 in the control group, for that reason, the ΔpH was used as an indicator due the organic matter input. Besides, results presented a ΔpH of 0.98, 1.15 and 0.71, respectively for treatments A, B and C (10 ton ha^{-1}) on 0-5 cm layer soil, with significant difference between treatments, which demonstrated to be originated exclusively from the organic matter, varying on the C quality of each one of the composts and not from the mineral fraction of the soil. For 40 ton ha^{-1} dosage, the treatments A and B presented significant difference compared to C (ΔpH 1.15, 1.18 and 0.56, respectively). In general terms, there is directly cause-effect over compost application and analytical analyzes, independently of dosage application and type of compost.

Keywords: Organic amendments, soil organic carbon, olive grove

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