



Influence of Pig Slurry on Microbial and Biochemical Characteristics of Soil in Albacete Region, SE Spain

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Soil quality is very important in terms of agricultural sustainability, ecosystem and terrestrial carbon (C) cycle. In turn, soil microbial and biochemical characteristics are indicative of nutrient cycling and soil organic matter dynamics. We investigated the effects of the pig slurries (raw pig slurry (RPS) and treated pig slurry (TPS) from liquid and solid feeding diets) on microbial and biochemical characteristics of soil under barley cropping system. Application doses of slurries are identified with legal doses of Castilla La Mancha Region, which is 210 kg N ha⁻¹ year⁻¹. Microbial biomass C, soluble C, black C and three soil enzymes (β -Glucosidase, β -galactosidase and Arylesterase enzymes) are studied to determine effect slurry on soil biochemical characteristics, which are very important in terms of C cycle in soil.

Black carbon content and β -Glucosidase enzyme activities are increased with all pig slurry applications from liquid and traditional feeding diet, as well as microbial biomass and organic carbon content and β -galactosidase enzyme activities are increased with slurry from liquid feeding diet doses. However, pig slurry application from liquid feeding diet doses have increased yield, quality, length and total biomass content of barley. Bioavailable metal contents are increased with all slurry application and with using high doses of slurry can be caused soil pollution. Pig slurries from liquid feeding diet had positive impacts on microbial and biochemical characteristics in terms of soil quality in comparison to the different feeding diets.

PS addition to soil had a very significant stimulating effect on the enzyme activities, microbial biomass, soluble and black C compared with different kind of PS and control plots on Mediterranean soil in barley monoculture. This effect may originate from the organic C, N, P and S compounds added with PS. The highest enzyme activity and microbial biomass were observed on the soil samples from the RPS treatment, whereas, black and soluble C was decreased with PS addition. There may have been a transient positive effect of the RPS treatments on the soil biochemical parameters. However, the effect could not be detected because of less labile C content during the experiment. The beneficial effects of the PS additions were less pronounced in the 0-30 cm. soil layer. In this monoculture barley production system and under these Mediterranean climate conditions, applications of TPS should be avoided, so they were associated with a decline in microbial counts and a leveling of almost all the enzymatic activities and microbial biomass C.

Keywords: Pig slurry, Microbial biomass C, soluble C, black C, β -Glucosidase, β -galactosidase and Arylesterase enzyme activities.