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DOCUMENTING AND MODELING THE ACCRETION OF SURFACE AND SUBSOIL ORGANIC CARBON IN AGRICULTURAL INCEPTISOLS RECLAIMED FROM MEDITERRANEAN SEA MARSHES IN SARDINIA.

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High input agriculture in productive Inceptisols that were reclaimed from sea marshes offers an opportunity to study the increase of soil organic carbon (SOC) in soils with originally low SOC. A dairy district occupying 3,500 ha in the western shore of Sardinia exhibits an agro-ecosystem with integrated animal, forage and vegetable production. The site has irrigated sandy soils, with high annual primary productivity (> 20 Mg dry biomass ha⁻¹ yr⁻¹). Soil processes are controlled by seasonal dynamics of the water table. We documented the current SOC content and its distribution with depth for several soil profiles. The SOC in the top 0.5 m of the soil profiles ranged from 47 to 192 Mg ha⁻¹, with 62% (range 35% to 74%) of SOC in the plowed layer (0.3 m). Modeling studies reproducing the historic management to estimate the annual C input via roots, residues, manure and the level of mechanical soil disturbance indicate that the rate of C accumulation was substantial in the past and might be decreasing in the last years due to reduced manure applications following the Nitrate Directive 91/676/CEE. Policy oriented to limit nitrate leaching may cause reduced C input rates and could cause a slow but steady decrease in SOC if C input rates are insufficient to sustain current SOC levels. Future work will address technologies to prevent soil C loss and study the effect of the water table on soil organic matter and the nitrogen cycle.