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Rice-pastures rotations conversion to more intensive soil use systems: Soil organic carbon dynamics impacts.

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Rice-pastures rotations are very unique sustainable production systems in Uruguay, but in the last decade appeared an increased interest to intensify them. Soil Organic Carbon (SOC) is an important soil quality indicator and key to mitigate greenhouse gases. We evaluated soil use intensity impacts on total SOC, particulate organic carbon (C-POM; 53-2000 μm) (0-5; 5-15 cm depth) and microbial biomass (MB) (0-10 cm depth) in a field-scale rice rotation systems experiment (Natraquoll) (33° 16' 23" S; 54° 10' 24" W; 22 MASL). Treatment were established in a 20yrs rice-pasture rotation field and included: 1) rice monoculture (RM, 1yr), with *Trifolium alexandrinum* in winter; 2) rice-soybean (RS, 2yr) with *Lolium multiflorum* and *Trifolium alexandrinum* in winter; 3) rice-row crops (RC, 4yr) rice-soybean-rice-sorghum with the same cover crops than RS in winter; 4) rice-short pasture (RSP, 2yr) rice rotating with a biannual pasture of *Lolium multiflorum* and *Trifolium pratense* during 1.5yr; 5) rice-long pasture (RLP, 5yr) rice-rice in the first 2 summers followed by a perennial pasture of *Festuca arundinacea*, *Trifolium repens* and *Lotus corniculatus* during 3.5yr. All rotations phases were present in time and replicated in space (Basic Design). After four years, no total SOC differences in the 0-15 cm depth were found between rotations (29.3 Mg C ha⁻¹). However, rice rotating with perennial pastures had 19.5% greater C-POM content than continuous cropping rice systems (RM, RC and RS) (3.93 Mg C ha⁻¹) for 0-5 cm depth, representing around 40% and 34% of total SOC for RLP-RSP and RM-RC-RS, respectively. No differences on C-POM were found between rotations in the 5-15 cm depth. The greatest values for MB were observed in RSP, RLP and RM (69.3; 55.3 and 53.5 mg C-CO₂ 100gr dry soil, respectively), followed by RS and RC (34.8 and 29.7 mg C-CO₂ 100gr dry soil, respectively). The aggregate of data suggests that, for soils under rice-pasture rotations in temperate climates, the intensification with other row crops and/or a higher proportion of rice in the rotation may make SOC more vulnerable to lose, even under conservation practices.