RIO18 21st World Congress of Soil Science
21 WORLD CONGRESS OF SOIL SCIENCE
Sunday 12 – Friday 17 August 2018
Rio de Janeiro, Brazil
Rio de Janeiro August | 12 - 17

Can we intensify rice-pastures rotations in Uruguay? Midterm impacts on soil organic matter.

Ignacio Macedo[1]; Virginia Pravia[1]; José Terra[1]

Instituto Nacional de Investigación Agropecuaria[1]

Soil organic carbon (SOC) is an important soil quality indicator. Rice-pastures rotations in Uruguay are unique sustainable production systems, challenged in the last decade by an increasing interest of production intensification. We evaluated soil use intensity impacts in a field-scale rice rotation systems experiment (33° 16' 23'' S; 54° 10' 24'' W; 22 MASL). Treatments were established in 2012 in a 34 yr rice-pasture rotation field (Natraquoll), including: 1) rice monoculture (RM, 1 yr), with *Trifolium alexandrinum* (TA) in winter; 2) rice-soybean (RSy, 2yr) with *Lolium multiflorum* (LM) and TA in winter; 3) rice-row crops (RC, 4 yr): rice-soybean-rice-sorghum with the same cover crops as RSy in winter; 4) rice-soybean-short pasture (RSySP, 6 yr) rice-soybean-soybean-rice with TA and LM during winter followed by 2.5 yr of a perennial pasture of *Festulolim sp.* and *Lotus corniculatus*; 5) rice-short pasture (RSP, 2 yr) rice rotating with a biannual pasture (1.5 yr) of LM and *Trifolium pratense*; 6) rice-long pasture (RLP, 5 yr) rice-rice followed by 3.5 yr of a perennial pasture of *Festuca arundinacea*, *Trifolium repens and Lotus corniculatus*. All rotations phases were present in time and replicated in space. Total SOC (TSOC), total nitrogen (TN) and particulate SOC and nitrogen (C-POM and N-POM; respectively, 53-2000 µm) (0-15 cm depth) were used to evaluate soil quality. After five years, no differences were found between rotations in TSOC and TN (29.3 Mg C ha^{-1} and 3.16 Mg N ha^{-1}). No differences were found in C-POM and N-POM when RLP was compared with RSP or RSySP. However, RLP had respectively 18% and 19% greater C-POM and N-POM content than cropping rotations (RSy and RC) (6.06 Mg C ha^{-1} and 0.48 Mg N ha^{-1}), representing around 23.6% and 20% of TSOC for RLP and RC-RS, respectively. The aggregate of data suggests that, for soils under rice-pasture rotations in temperate climates, there are possible pathways for intensification without losing SOC in the midterm. However, the absence of perennial pastures in the rotation can make SOC more vulnerable to loses.

Keywords: Sustainability; soil health; sustainable intensification.

Financial Support: This research is part of the Master of Science Thesis of Ignacio Macedo at the Universidad de la República. Funding provided (Scholarship) by Agencia Nacional de Investigación e Innovación, POS_NAC_2015_1_109776.