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ABSTRACT BOOK

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4. Soil health in achieving the Sustainable Development Goals 4.03 125012 - Matching food security and environmental goals: phosphorus, a key global element

CONTRIBUTION OF FOREST PLANTATIONS TO SOIL PHOSPHORUS RESERVES

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Forest plantations represent a productive alternative in Argentinian Pampas region and little is known about how their use impacts on phosphorus (P) cycle in long-term. In this context, understand how these plantations regulate the functions of the ecosystem and in particular their impact on soil total P (TP) reserves is essential to maintain soil productive capacity, make sustainable use at scale of stand or basin and contribute to mitigate climate change. Understanding the mechanisms underlying P availability is important to predict forest productivity in a changing environment, particularly with agricultural history. The aim was to evaluate the TP reserves in poplar plantations (*Populus* spp) with different ages and in a continuous agriculture system with more than 40 years. The study was carried out in the Pampas region, Argentina, through a completely randomized design with 3 repetitions on an entic Hapludol soil from the Saforcada series. Treatments were: 1) Poplar stand 1: 9-year-old plantation; 2) Poplar stand 2: 19-year-old plantation and 3) an agricultural site. Soil samples were obtained, from which the concentration of TP and bulk density (DAP) were measured. Since DAP showed differences between treatments, we calculated TP values at same soil mass. The TP mean reserves at 0-100 cm were 1714 ± 89 ppm, 2370 ± 105 ppm and 2318 ± 152 ppm for agricultural site, poplar stand 1 and poplar stand 2, respectively. The forest plantation increased TP reserves by 39.6 and 42%, after 9 and 19 years of plantation, respectively, compared with agriculture site (Kruskal-Wallis test; $p < 0.07$). We hypothesize that this increase was due to the absence of grain extraction and the mitigation of runoff losses. Plantation of fast-growing forest species produced significant changes in TP reserves, presenting a greater content of TP under poplar plantation in comparison with agriculture. Forest plantations represent an alternative productive which reduce nutrients exports and support the input of organic matter into the soil, contributing to the sustainability of agroecosystems.

Keywords: Poplar, Nutrients, Sustainability