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Phosphorus Speciation of Sequential Extracts of Organic Amendments using NMR Spectroscopy

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We carried out this study in order to determine the forms of phosphorus in various organic amendments using state-of-the art spectroscopic technique. Anaerobically digested biosolids (BIO), hog (HOG), dairy (DAIRY), beef (BEEF) and poultry (POULTRY) manures were subjected to sequential extraction. The extracts were analyzed by solution 31P nuclear magnetic resonance (NMR) spectroscopy. Most of the total P analysed by inductively coupled plasma-optical emission spectroscopy (ICP-OES) in the sequential extracts of organic amendments were orthophosphate, except POULTRY, which was dominated by organic P. The labile P fraction in all the organic amendments, excluding POULTRY, was mainly orthophosphate P from readily soluble calcium and some aluminum phosphates. In the poultry litter, however, Ca phytate was the main P species controlling P solubility. Such knowledge of the differences in the chemical forms of phosphorus in organic amendments are essential for proper management of these amendments for agro-environmental purposes

Key words: organic amendments, solution NMR, sequential fractionation, labile phosphorus