S07.02-P -15

SOLID-STATE 13C AND 15N NMR SPECTROSCOPIC ANALYSIS OF ORGANIC MATTER IN A MEDITERRANEAN SOIL AFTER AMENDMENT OF N-AMMOXIDIZED LIGNINS

De La Rosa José María[1], Liebner Falk[2], Pour Georg[2], Knicker Heike*[3]

[1]Instituto Tecnológico e Nuclear ~ Quimica Analítica e Ambiental ~ Sacavém ~ Portugal [2]University of Natural Resources and Life Sciences Vienna (BOKU) ~ Dep. of Chemistry, Wood, Pulp and Fiber Chemistry ~ Tulln an der Donau ~ Austria [3]Instituto de Recursos Naturales y Agrobiología de Sevilla (IRNAS-CSIC) ~ Geoecología, Biogeoquímica y Microbiología Ambiental ~ Seville ~ Spain

Nitrogen (N) availability is a crucial factor for maintaining soil productivity. However, application of mineral N fertilizer encounters environmental concerns. Therefore, the use of ammonoxidised technical lignins was suggested, since they may act as potential slow N-release fertilizers. Testing their applicability to agricultural soils, studying their impact on soil organic matter composition and stability, bioavailability of added N and the impact on soil fertility and are still needed, and were the major goals of this study. For those purposes we performed pot experiments in which Lolium perenne was grown on a typical Andalusian soil (calcareous Rhodoxeralf) after amendment of N-lignins, highly enriched in 15N (15N-Sarkanda and 15N-Indulin ammoxidized lignins) for 75 days (Liebner et al, 2011). The 15N enrichment allowed the application of solid-state 15N NMR spectroscopy. The solid-state 13C NMR spectra of the 15N-lignins showed the typical lignin pattern and the respective solid-state 15N CPMAS NMR spectra demonstrated signals assignable to pyrrole-type N, aminobenzoquinones, aminohydroquinones, aromatic amines and ammonium. However, after 30 days of incubation those signals disappeared in favor to signals typical for peptide structures, although some intensity remained in the chemical shift region assignable to pyrrole-type N. The shift of 15N signal intensity is most tentatively caused by the fast and efficient recycling of amino groups released from the lignin backbone for the build-up of new microbial biomass. With respect to soil organic C, the solid-state 13C NMR spectroscopy revealed no major alteration due to incubation. Reference; Liebner, F., et al., 2011. Angewandte Chemie 50, 34-39.