

Legros S., **Doelsch E.**, Masion A., Chaurand P., Rose P., Borschneck D., Proux O., Saint-Macary H. and Bottero J.Y.: *Copper and Zinc Speciation In Pig Slurry: Implications On Mobility and Bioavailability In Soils*. ASA-CSSA-SSSA International Annual Meeting, 16-19 October, 2011, San Antonio TX, USA.

The fate of pollutants associated with organic wastes is a key issue. For example, pig slurry presents high concentration of Copper (Cu) and Zinc (Zn) since they are used (at high concentration) as essential micronutrients in animal feeds. As a consequence, Cu and Zn accumulation was measured in soil surface layers that had been amended with pig slurry, inducing phytotoxicity as well as groundwater quality degradation. Better prediction of the mobility and bioavailability of Cu and Zn from pig slurry spreading can be achieved by determining the speciation of these elements.

The aim of this study is to investigate Cu and Zn speciation in pig slurry. A multitechnique approach was adopted including size fractionation, XRD, SEM-EDS, μ XRF and XAS.

The present study demonstrated that only 0.2% of total Cu or Zn present in pig slurry was bound to particles smaller than 0.45 μ m, while 75% of total Cu and Zn was bound to particles in the 0.45–20 μ m size range. μ XRF highlighted the colocalisation of Cu and sulfur. In addition, geochemical modelling demonstrated that physical chemical conditions within pig slurry lagoon are compatible with the precipitation of chalcocite (Cu_2S). Finally, XANES shows that Cu speciation in raw pig slurry and size fractions is described by Cu_2S and that its oxidation state is Cu(I). These Cu speciation in pig slurry may be the main reason for the observed Cu accumulation at the soil surface. Zn speciation revealed three patterns 49% Zn bound to organic matter, 37% amorphous Zn hydroxide, and 14% sphalerite (ZnS). The detected presence Zn sulphide, was unexpected and is reported for the first time. These three Zn forms seemed to be soluble in neutral or weakly acid soil systems, so the long-term impact of pig slurry spreading could lead to Zn leaching.

ASA : American Society of Agronomy
CSSA : Crop Science Society of America
SSSA : Soil Science Society of America