

SOERE PRO: Long term field experiment network for research on the recycling of organic matters issued of wastes in agriculture

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Introduction

The use of organic residues in agriculture requires better evaluation of short- and long-term effects in terms of agronomic efficiency and putative environmental and sanitary impacts. Such evaluation needs in situ long-term field experiments carried out with local farming conditions.

In France, the SOERE PRO has been created to evaluate benefits and risks associated to organic residue application in agriculture. The SOERE PRO provides data (1) to better evaluate the effects of regular organic residues application on organic matter dynamic and potential C storage in soils, biogeochemical cycles of nutrients (C, N, P), fate of potentially present chemical and biological contaminants, soil biological activities; (2) to simulate the long-term consequences of regular application and integrate them in an environmental analysis that will allow to (3) test various alternative scenarios of application.

Materials and method

SOERE PRO is a network of long-term field experimentations dedicated to the study of organic residue application in agriculture. SOERE PRO is composed by 3 on-going sites (QualiAgro comparing urban composts and manure, EFELE comparing different manures and Colmar comparing composted and non-composted residues) which allow the exploration of various agro-pedo-climatic contexts and 2 historical sites (La Bouzule and Couhins comparing residues with increasing levels of contamination) representing a resiliency context as organic waste applications stopped several years ago. Two other sites will be soon added under tropical conditions (one in Burkina Faso and one soon created in La Reunion island).

The experimental sites allow measuring the long-term evolution of the agro-system after repeated applications of organic residues derived from urban and agricultural activities (sludge, composts, farmyard effluents) and undergoing various treatments (none, composting, anaerobic digestion). The SOERE PRO network involved different research institutes and collaborations with concerned professional partners.

For the 3 on-going sites and the future site in La Reunion island, the same instrumentations are installed to monitor the hydrodynamic functioning of soil: TDR probes, tensiometers, temperature sensors, lysimeters. The climatic data are monitored on all sites.

Studied organic residues, soils, crops and waters (rains and leached waters) are sampled and analysed. Same analyses (parameters, analytical methods, laboratories) are done on samples for the 3 on-going sites and in the future for the 4 instrumented sites of the SOERE PRO. Analysed parameters are : C, N, P, K, Ca, Mg, Na ; mineral N in soil, crop and water ; crop yields ; trace elements and some organic pollutants ; human pathogens ; soil physical properties.

Data management

Data management is centralized at the SOERE PRO level with the development of web interfaces (data integration and extraction) and data bases: BasePRO for field experiment data, BaseTYPO for analytical data of organic wastes applied in France, BaseECHANTILLON for information concerning SOERE PRO samples.

Conclusion and perspectives

The coordination of the measurements centralized in the SOERE PRO data bases will permit to compare results found in different sites to better evaluate at the field scale (1) the actual input and output of elements and (2) the evolution of the agro-system after repeated inputs of organic residues in various pedo-climatic contexts. Such long-term experiment are necessary for the calibration of models that will be used to simulate the evolution of agro-systems over a longer period of time then to run scenarios of application to define sustainable management of organic residues in cropping systems.

Keywords

Long-term field experiments, data bases, organic residues, agronomic values, putative impacts