



Field and laboratory tests for assessing the feasibility on the use of municipal treated wastewater for agricultural irrigation

Helena Gallardo (1), Raúl Lovera (2), Mahjoub Himi (2), Alexandre Sendrós (2), Eva Marguí (3), Josefina C. Tapias (4), Ignasi Queralt (1), and Albert Casas (2)

(1) Earth Sciences Institute ICTJA. CSIC. Barcelona. Spain (iqueralt@ictja.csic.es), (2) Dept of Geochemistry. P.P.G. University of Barcelona. Spain (albert.casas@ub.edu), (3) Dept of Chemistry. University of Girona. Spain (eva.margui@udg.edu), (4) Soil Science Lab. University of Barcelona. Spain (jtapias@ub.edu)

The scarcity of water resources in many regions of the planet in the XXIst century is a challenge which concerns the current societies. Water use has been growing during the last decades. Therefore, different strategies of water management in many water-deficient regions are being carried out, especially in densely populated areas, in coastal zones or in regions under arid or semi-arid climate. During the last years, there has been a growing interest in the use of the subsurface for water storage through shallow percolating ponds. Moreover, on a best-practices basis, the use of reclaimed wastewater for different purposes is becoming more usual. The irrigation with municipal treated wastewater (MTWW) is an interesting strategy especially in the agricultural sector, which represents the main water user in contrast with other socioeconomic activities.

The study area is located near Castellbisbal, on the lower stretches of the Llobregat River close to the Metropolitan area of Barcelona (Catalonia, Spain). The site consists on a percolating pond and agricultural fields around. In order to assess the feasibility of using reclaimed wastewater for different uses in this site, several experiments both on field and at the laboratory were carried out.

First of all, a detailed non-destructive geophysical survey was conducted using electrical resistivity tomography (ERT) technique. Geophysical data were constrained by geological and hydrogeological properties from boreholes and water wells.

On the other hand, laboratory experiments were carried out through batch and column assays, focused on the detailed water-mineral particles interrelationships that can occur at the vadose zone. Soil samples from the crop fields around and water samples from the nearest well, as from the municipal wastewater treatment plant were used. Chemical and mineralogical composition of the soils were determined by using non-destructive spectroscopic techniques as x-ray fluorescence (XRF) and x-ray powder diffraction (XRD), respectively. Water chemistry, both input water and leachates obtained after experiments, was assessed by means of multielemental inductively coupled plasma (ICP) analysis. The objective of this experiment was to observe whether differences about soil- water interactions exist by using either groundwater and reclaimed wastewater.

To conclude, this study aims to support the development and assessment of using MTWW for different potential uses on this area, as a strategy of water management.