

Effects of a 25-year application of treated wastewater on soil properties of Cebala-Borj Touil irrigated perimeter (North Tunisia)

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ABSTRACT

In arid and semi-arid areas, the reuse of treated wastewater (TWW) is one of the solutions to the problem of water scarcity. Nevertheless, this resource may represent some risks to the environment and human health. In Tunisia, the use of TWW for irrigation has started since the sixties but its impact on soil quality is still not well understood. This study aims to investigate the effects of long-term irrigation with TWW on soil properties of Cebala-Borj Touil irrigated perimeter (North Tunisia). The studied soil is a fluvisol irrigated for 25 years with TWW. Water used for irrigation presents a high organic load, an alkaline pH and a relatively high salinity (3.73 mS/cm) but with trace metals concentration which does not exceed Tunisian and FAO standards. Two profiles were digged: P1 represents the soil irrigated with TWW and P2 is the control (non-irrigated soil). Soil samples were taken from each horizon and analyzed for their granulometric composition, pH, electrical conductivity (EC), trace metal elements (TME) and total organic matter (OM) content. Soil color and structure were equally described. The comparison of the two profiles showed that the irrigated soil presented a lighter color, a different structure and a slightly finer texture, mainly in surface layers, than the control. Besides, an acidification of soil surface and a problem of salinization/sodication accompanied with an OM accumulation in soil deep horizons were observed. TME concentrations were under the detection limit except for Mn, which showed an increase in the top horizon of P1 as compared to P2. Results show that the soil properties were seriously affected after 25-years irrigation with TWW, which must be improved by some management measures.

Keywords: Semi-arid region; Treated wastewater; Irrigation; Soil properties; Organic matter

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