

## Effects of Reclaimed Agro-Industrial Wastewater for Long-Term Irrigation of Herbaceous Crops on Soil Chemical Properties

**Authors :** E. Tarantino, G. Disciglio, G. Gatta, L. Frabboni, A. Libutti, A. Tarantino

**Abstract :** Worldwide, about two-thirds of industrial and domestic wastewater effluent is discharged without treatment, which can cause contamination and eutrophication of the water. In particular, for Mediterranean countries, irrigation with treated wastewater would mitigate the water stress and support the agricultural sector. Changing global weather patterns will make the situation worse, due to increased susceptibility to drought, which can cause major environmental, social, and economic problems. The study was carried out in open field in an intensive agricultural area of the Apulian region in Southern Italy where freshwater resources are often scarce. As well as providing a water resource, irrigation with treated wastewater represents a significant source of nutrients for soil&ndash;plant systems. However, the use of wastewater might have further effects on soil. This study thus investigated the long-term impact of irrigation with reclaimed agro-industrial wastewater on the chemical characteristics of the soil. Two crops (processing tomato and broccoli) were cultivated in succession in Stornarella (Foggia) over four years from 2012 to 2016 using two types of irrigation water: groundwater and tertiary treated agro-industrial wastewater that had undergone an activated sludge process, sedimentation filtration, and UV radiation. Chemical analyses were performed on the irrigation waters and soil samples. The treated wastewater was characterised by high levels of several chemical parameters including TSS, EC, COD, BOD<sub>5</sub>, Na<sup>+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup>, NH<sub>4</sub>-N, PO<sub>4</sub>-P, K<sup>+</sup>, SAR and CaCO<sub>3</sub>, as compared with the groundwater. However, despite these higher levels, the mean content of several chemical parameters in the soil did not show relevant differences between the irrigation treatments, in terms of the chemical features of the soil.

**Keywords :** agro-industrial wastewater, broccoli, long-term re-use, tomato

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