Assessment of repeated irrigation with citrus wastewaters on soil fertility and *Lactuca sativa*

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The increase of water demand and degradation of water body quality call for a proper use of water sources. Water is a critical input for agricultural production and plays a key role in food security. Irrigated agriculture represents 20 percent of the total cultivated land and contributes for 40 percent of the total food produced worldwide [1]. Due to population growth, urbanization, and climate change, the competition for water resources is expected to increase, with a particular impact on agriculture. Moreover, at the same time, the demand of water for the agricultural production to assure food for the increasing world population is expected to increase [2]. The agricultural sector has proved to be the most suitable for the use of wastewater. Indeed, the use of wastewater for crop irrigation has grown a lot in recent years, reaching about 20 million ha of irrigated land worldwide [3]. Citrus wastewaters (CWWs), by-products of the citrus fruit transformation process, are produced in large volumes worldwide. Because CWWs may hold both nutrients and value-added biomolecules, they can be exploited for agricultural purposes [4]. Previous research has found that a single application of not treated CWWs to soil increased its organic C [5]. Such an increase, in turn, stimulated microbial biomass and activity (CO_2 emission), although in an ephemeral way. On the other hand, soil reactions decreased from 2 to 3 pH units, although, after 7 days, it recovered reaching values like those of the control (distilled water). Also, the electrical conductivity showed a transient increase [5]. According to these findings, the reuse of CWWs for agricultural purposes may plays a critical role within a circular economy perspective. Little is known about the effect of repeated use of CWWs for crop irrigation on soil fertility and crop growth. Based on the above considerations, a pot experiment was carried out to investigate the effects of repeated applications of not treated CWWs on soil and lettuce crops (*Lactuca sativa*). The study was conducted in a greenhouse. Lettuce in pots was irrigated with lemon or orange wastewaters. CWWs, diluted with water at the rate of 1/3 or 2/3 or not diluted (3/3), were used to maintain the soil water holding capacity between 40 and 60%. The experiment lasted one month, at the end of which soils, plant roots and leaves were analysed. Soil samples were analysed to determine soil reaction, electrical conductivity, extractable C, CO_2 emission as a measure of microbial activity, ammonium and nitrate. Plant roots and leaves were washed with distilled water, oven-dried at 60 °C for 48 h and dry weight was determined. Afterwards, they were pulverised and mineralised to determine the main nutrients. In the poster, results are reported and discussed.

Bibliography

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