



The impacts of irrigation with transferred and saline reclaimed water in the soil biological quality of two citrus species: Adaptations to low water availability

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Mediterranean agroecosystems are limited by the availability of water and hence it is fundamental to find new water sources for sustainable agriculture in the face of climate change. Here, the effects of irrigation with water from different sources were analyzed in the soil microbial community and plant status of grapefruit and mandarin trees in a Mediterranean agro-ecosystem located in south-east of Spain. Four irrigation treatments were evaluated: i) water with an average electrical conductivity (EC) of 1.1 dS m⁻¹ from the “Tagus-Segura” water-transfer canal (TW); ii) reclaimed water (EC = 3.21 dS m⁻¹) from a wastewater-treatment-plant (RW); iii) irrigation with TW, except in the second stage of fruit development, when RW was applied (TWc); and iv) irrigation with RW except in the second stage, when TW was used (RWc). Phospholipid fatty acids indicated that microbial biomass was greater under grapefruit than under mandarin. In the case of grapefruit, TW showed a lower bacterial biomass than RW, RWc, and TWc, while RW showed the lowest values in the mandarin soil. In grapefruit soil, β -glucosidase and cellobiohydrolase activities, related to C cycling, were greater in RW and TWc than in TW and RWc. In mandarin soil, the greatest activity of these enzymes was found in TWc. The saline stress induced lower net photosynthesis (A) and stomatal conductance (gs) in plants of RW, RWc and TWc in comparison with TW. The annual use of reclaimed water or the combined irrigation with TWc positively influenced the soil biological quality of a grapefruit agro-ecosystem. Conversely, the mandarin soil community was more sensitive to the annual irrigation with RW.