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## **SECONDARY TREATED WASTEWATER AS A SUPPORT STRATEGY FOR TREE CROPS IRRIGATION: NUTRITIONAL AND PHYSIOLOGICAL RESPONSES ON APPLE TREES**

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### **Abstract**

Wastewater for irrigating tree crops may act both as water and mineral nutrients source, offering potential agronomical and environmental advantages. This work investigated the effect of an entire season supply of secondary treated wastewater (STW) on the nutritional and physiological responses of 3 year old apple trees. Trees (Gala /M9) were individually grown on 40-L pots filled with a sandy-loamy soil and drip irrigated with: 1) Tap water (TW) (without any mineral fertilizer inputs); 2) Tap water plus mineral fertilized inputs (TW+MF) and 3) STW (without any mineral fertilizer inputs). Each treatment was applied to five individual trees. Daily leaf carbon assimilation rates were promoted by STW, compared to TW trees, although TW+MF trees showed the highest values. Although STW provided a “fertigation-like” effect, the tree nutrient demand was only partially fulfilled. Leaf mineral concentration resulted mostly in the optimal range for STW and TW+MF, except TW, which showed nutritional deficiencies, especially on leaf rather than on fruit tissues. No heavy metal contamination was recorded in STW leaves nor in fruit tissues. A decrease in STW-irrigated tree stem water potentials suggested a moderate salinity stress that indirectly improved fruit quality parameters. Irrigating with STW did not enhance shoot growth compared to TW+MF, promoting instead fruit yield. Results indicate how STW may be suitably reused as a precious resource for supporting the traditional fresh-water supplies in irrigating fruit tree crops. Moreover, the application of STW could allow to partially save tree mineral fertilization needs, thanks to its nutritional inputs.

*Key words:* fertilization, nitrogen, plant water relations, water reuse, water scarcity

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