

# Assessment of repeated irrigation with citrus wastewaters on soil fertility

C. Lucia, L. Badalucco, E. Palazzolo V.A. Laudicina

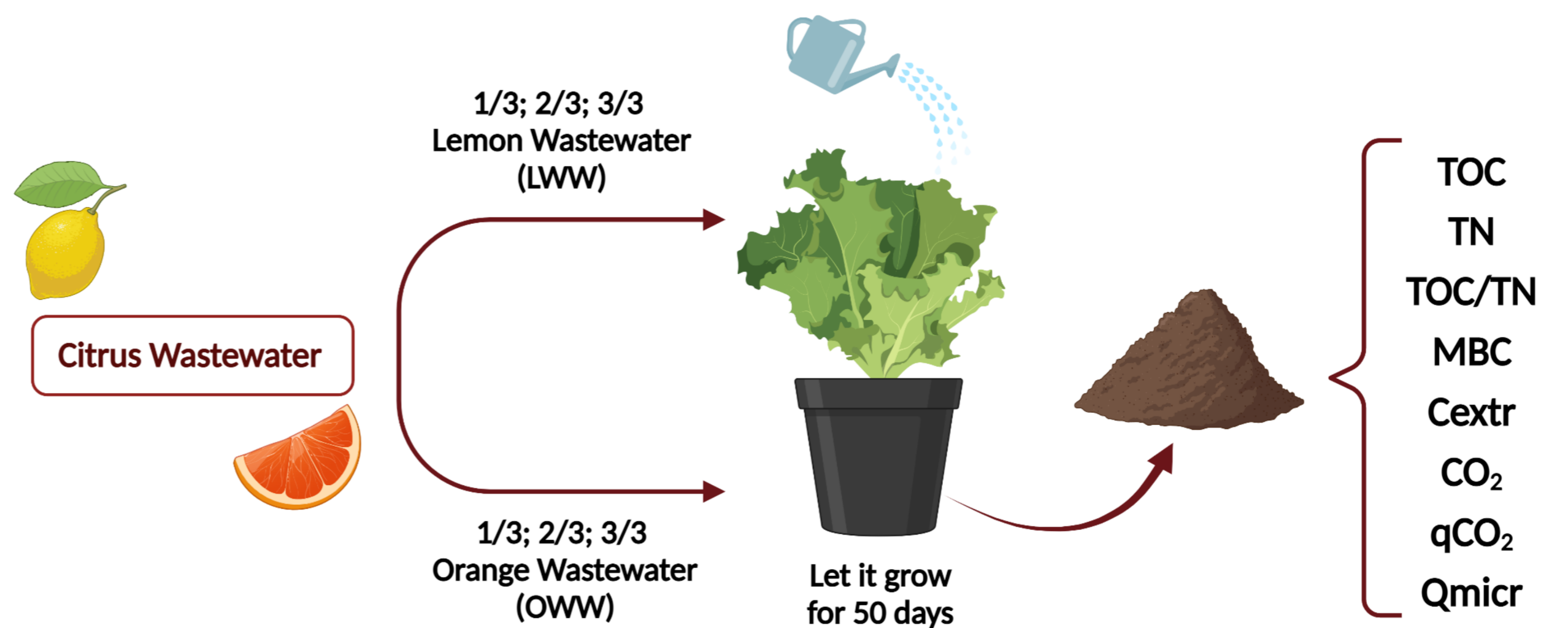
Department of Agricultural, Food and Forestry Sciences, University of Palermo, Italy

## INTRODUCTION

Water is a critical input for agricultural production and plays an important role in food security. The amount of water for the agriculture sector is expected to decrease in the next future, due to population growth, urbanization, and climate change. Thus, it is important to find alternative sources of water. Citrus wastewaters (CWWs) produced by industry, holding organic matter and plant nutrients, may be used for crop irrigation within a circular economy perspective [1].

The **aim of the work** was to assess the effect of CWWs used for plant irrigation on chemical and biochemical soil fertility.

## METHODS



## RESULTS

Irrigation with CWWs increased total organic carbon (TOC) only when CWWs were applied at the highest dose. Such an increase was greater in soil irrigated with OWW 3/3 compared to dose irrigated with LWW 3/3 (Fig. 1A). Total N (TN) (Fig. 1B) in soils irrigated with CWWs followed the same pattern of TOC. As a consequence, the ratio TOC/TN did not show significant differences among the treatments (Fig. 1C). As a consequence of the increase of TOC, also microbial biomass carbon (MBC), extractable organic carbon (Cextr) and microbial respiration (Figs. 1D, 2A, 2B) were increased by CWWs application, being such an increase proportional to the applied dose. The stimulation of microbial respiration following the application of CWWs increased the metabolic quotient ( $qCO_2$ ) which suggested the incoming of stress conditions (Fig. 2C); however, also under stress, microorganisms in soil irrigated with CWWs, except for those irrigated with OWWs 3/3, were able to use organic C for their growth as evidenced by the increase of the microbial quotient (Qmicr) (Fig. 2D).

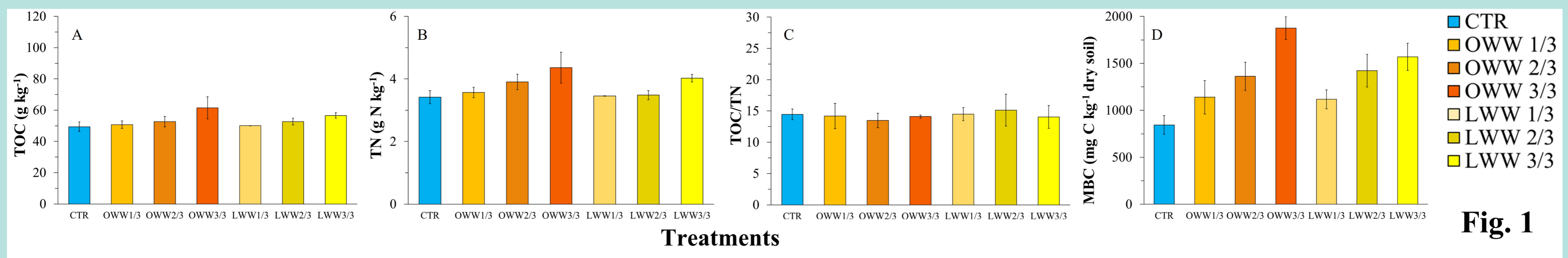


Fig. 1

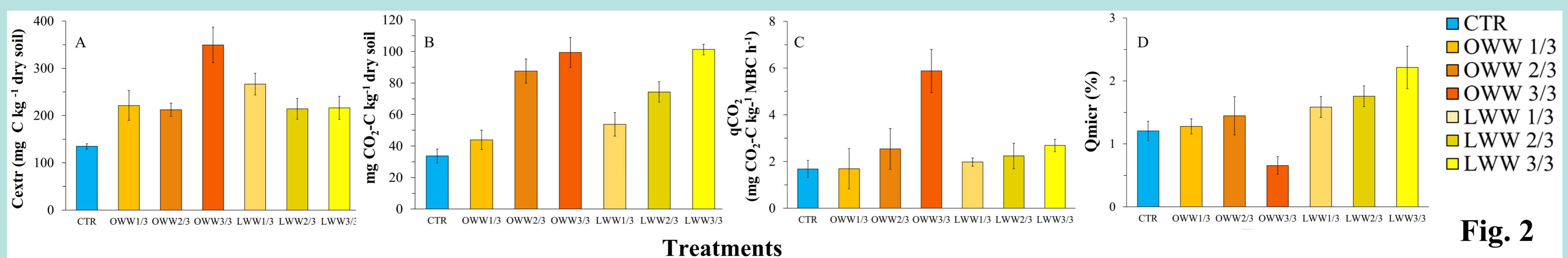


Fig. 2

## CONCLUSIONS

Results provide evidence that CWWs may be used for soil irrigation within sustainable agriculture purposes since they increased total and labile C pools and stimulated microbial activity. However, the application of not diluted OWWs should be avoided as may inhibit C assimilation by soil microorganisms.

## REFERENCES

[1] Ioppolo, A., Laudicina, V. A., Badalucco, L., Saiano, F., & Palazzolo, E. (2020). Wastewaters from citrus processing industry as natural biostimulants for soil microbial community. *Journal of Environmental Management*, 273, 111137.