

Citrus industry sludge valorisation and their effects on soil fertility

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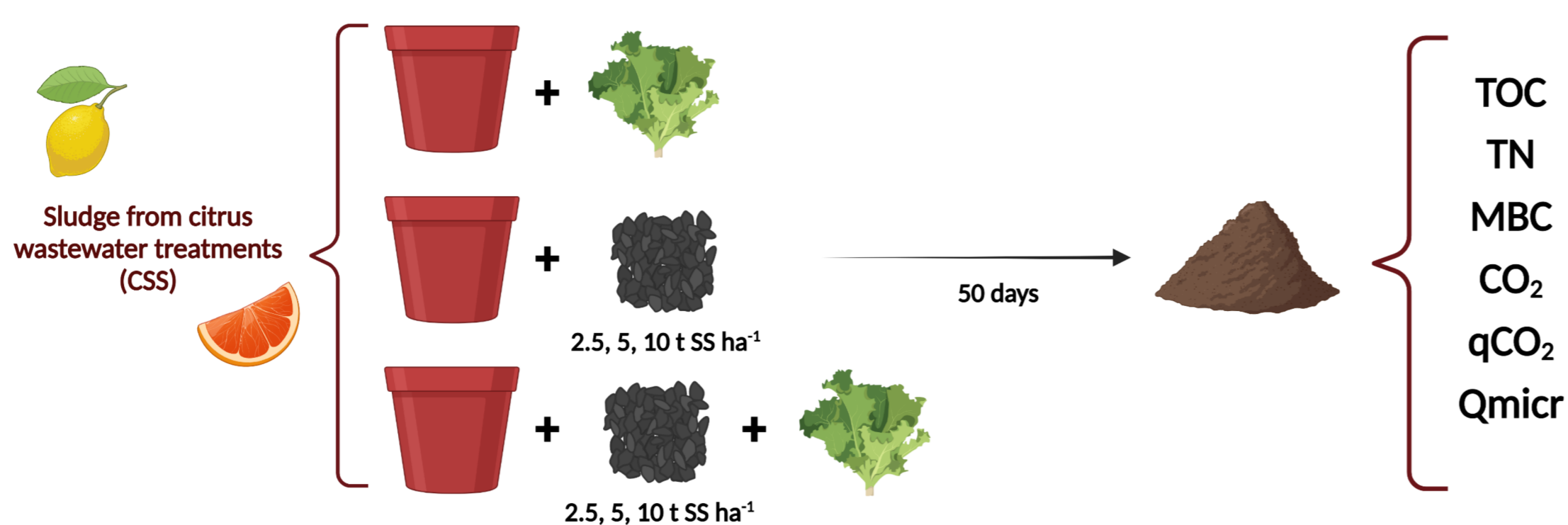
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INTRODUCTION

The excess sludge production is a drawback of intensive biological treatments of CWWs. Indeed, the excess sludge generated from the transformation of the organic matter into new biomass entails high expenditure for its treatment and disposal, accounting for 30–40% of the total capital cost and 50% of plant operation costs. Considering the high organic content of the sludge produced during CWWs treatment, agricultural utilization could be a feasible solution in line with the circular bio-economy model. In this sense, sludge could be used as a fertilizer since the organic nitrogen and phosphorous in bio-solids are used quite efficiently by crops upon the mineralization process [1].

The **aim of this study** was to assess the effect of not composted and air-dried sludge (CSS) produced during CWWs biological treatment on chemical and biochemical soil fertility.

METHODS



RESULTS

Total N (TN) was not affected by any dose of citrus sewage sludge (CSS) applied both in presence and absence of the plant (Fig. 1B). Total organic carbon (TOC) generally increased following the application of CSS being such an increase more consistent at the highest CSS dose and in absence of the plants (Fig. 1A). On the contrary, a general decrease of microbial biomass carbon (MBC) occurred following the application of CSS with the only exception of the CSS 10-P treatment (Fig. 1C). Such a decrease could be ascribed to a deleterious effect of the CSS. Indeed, also microbial respiration was not stimulated by CSS and in particular it decreased by increasing the dose of CSS in soil only amended (Fig. 1D). Microbial and metabolic quotients (Qmicr and qCO₂) were slightly affected by the treatments (Figs. 1E and 1F).

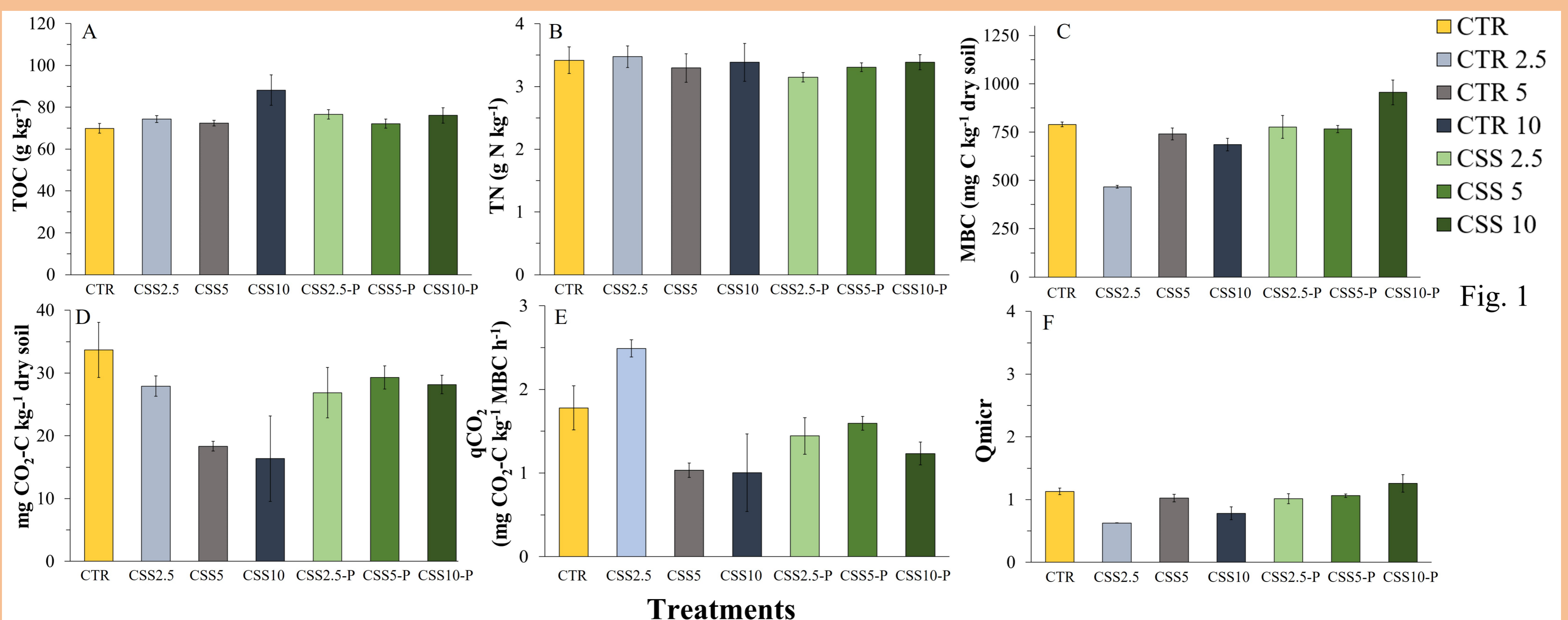


Fig. 1

CONCLUSIONS

Overall results of this study suggested that once addition of not composted and dried sewage sludge did not improve the investigated parameters generally used to assess soil fertility. Further studies are needed to assess repeated addition of CSS on soil fertility in the long term.

REFERENCES

[1] Lucia, C., Laudicina, V.A., Badalucco, Galati, A., Palazzolo, Torregrossa, E. M., Viviani, G., Corsino, S.F. (2022). Challenges and opportunities for citrus wastewater management and valorisation: A review. *Journal of environmental management*, 321:115924.