

CITRULLINE SPRAY TREATMENTS AFFECT TOMATO AND LETTUCE
TRANSPLANT PRODUCTIONUNIVERSITÀ
DEGLI STUDI
DI PALERMOAlessandro Miceli, Alessandro Esposito*, Alessandra Moncada, Filippo Vetrano
Department of Agricultural, Food and Forest Sciences (SAAF) – University of Palermo – Italy
*alessandro.esposito02@unipa.it

INTRODUCTION & AIM

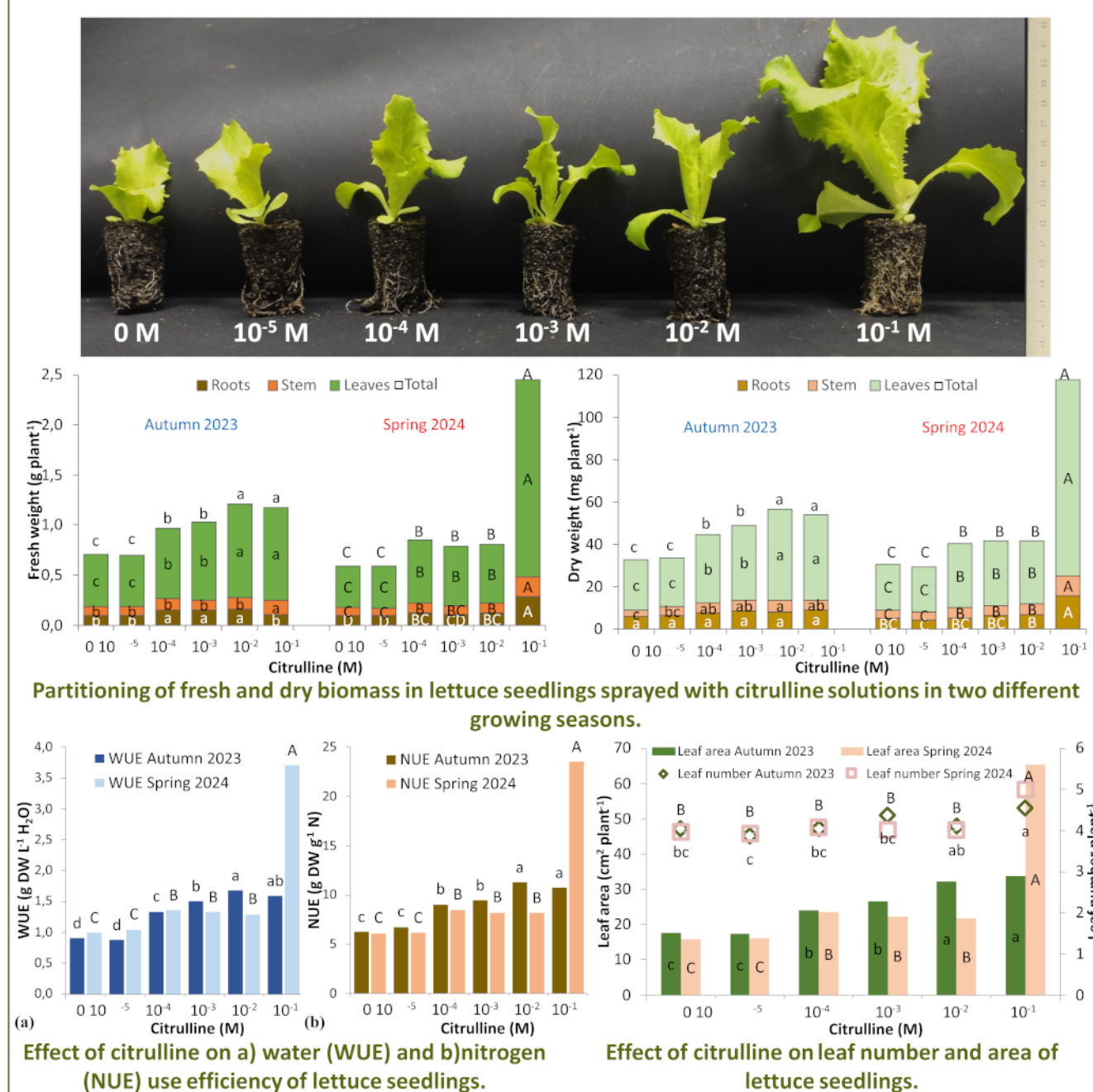
Citrulline is a non-protein amino acid that acts as an intermediate in the arginine biosynthetic pathway. It was first isolated from watermelon and is also found in high amounts in the fruits of other species within the Cucurbitaceae family. Citrulline can neutralize hydroxyl radicals and protect cellular enzymes from oxidative damage. It accumulates in the vegetative tissues of watermelon, melon, and chickpea plants in response to environmental stress. It is hypothesized that citrulline plays a role in facilitating nitrogen assimilation, endogenous nitrogen storage, and transport in higher plants. However, its role in agriculturally relevant species is still poorly understood. Some studies have highlighted significant changes in endogenous citrulline levels as a result of abiotic stress, but the effect of exogenous application on plant metabolism has yet to be investigated. This study aimed to evaluate the effect of citrulline spray treatments on the growth of lettuce and tomato seedlings in transplant nursery production.

METHOD

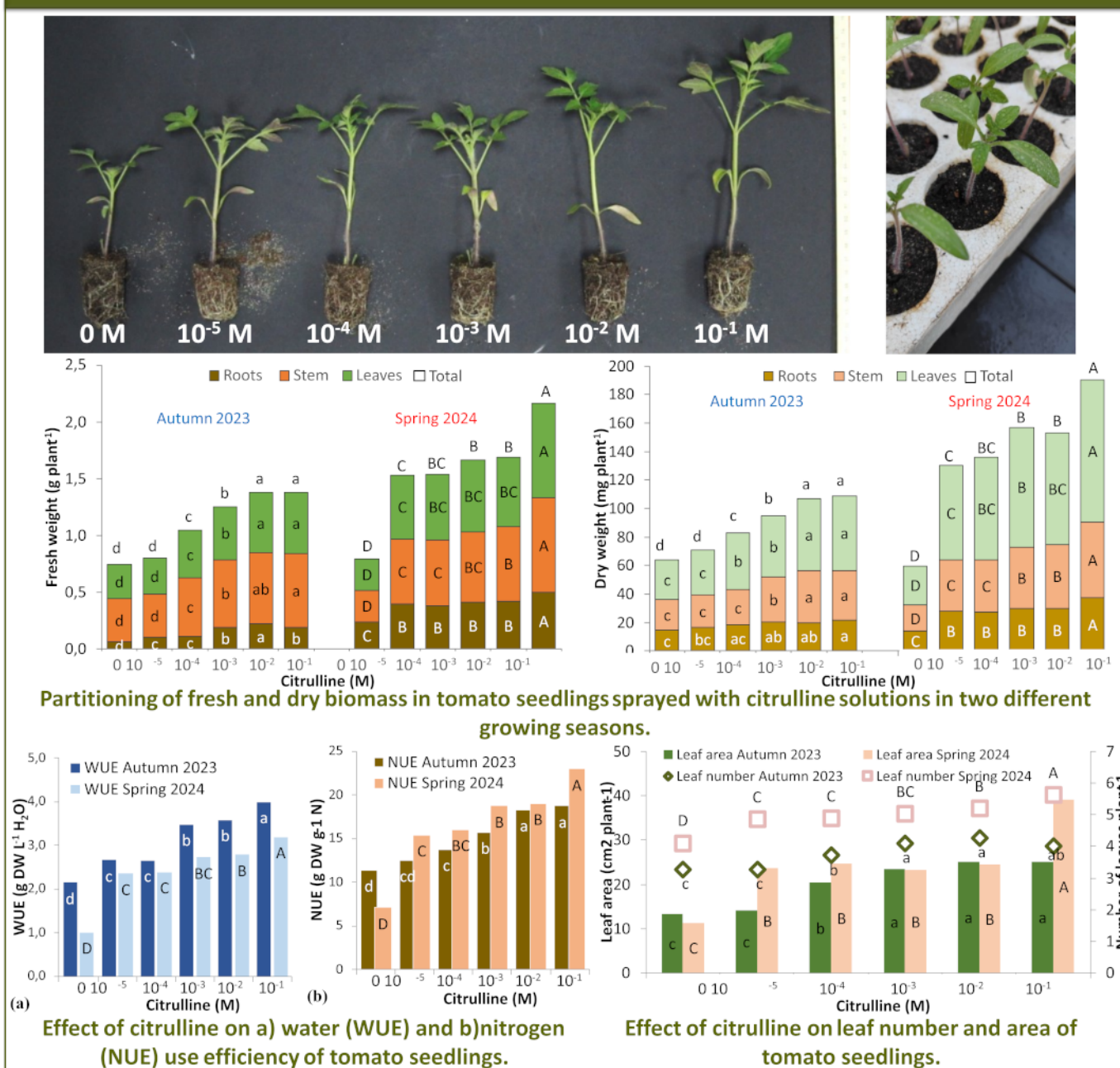
Tomato and lettuce seeds were sown in two different seasons (autumn 2023 and spring 2024) in trays with 104 (tomato) and 160 (lettuce) cells, filled with a commercial substrate. The seedlings were sprayed with citrulline at increasing concentrations (0, 10^{-5} , 10^{-4} , 10^{-3} , 10^{-2} , 10^{-1} M) in three distinct growth stages: at the emission of the first true leaf and after 7 and 14 days. Seedlings were irrigated using an ebb-flow system, which also enabled fertilization with a water-soluble NPK (20:20:20) fertilizer solution (2 g L^{-1}), applied 15 days after sowing. Once the seedlings reached the optimal stage for transplanting (5–6 true leaf stage), plants were sampled and several morpho-physiological parameters were assessed, including plant height, stem diameter, fresh and dry biomass distribution among leaves, stem, and roots, leaf number and area, specific leaf area (SLA), water use efficiency (WUE), and nitrogen use efficiency (NUE).



RESULTS: Lettuce



RESULTS: Tomato



CONCLUSION

Foliar application of exogenous citrulline positively influenced growth rates and biomass accumulation in seedlings of both species. A moderate but significant effect was observed at intermediate concentrations (10^{-4} – 10^{-3} M) compared to the untreated control, while the highest concentration produced a notably greater effect, especially in the spring trial. The biostimulant effect of citrulline on vegetable crops needs further investigation to better understand the underlying mechanisms affecting plant metabolism and nutritional status.