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Efficacy of biostimulants obtained from oil mill wastewater on plants under saline stress

Rocío Asencio-Vicedo[1], Borja Ferrández-Gómez[1], Antonio Sánchez-Sánchez[1], Juana D. Jordá[1], Mar Cerdán[1]

[1]Department of Biochemistry, Molecular Biology, Edaphology and Agricultural Chemistry, University of Alicante, Alicante, Spain.

INTRODUCTION & AIM

Salinity is a type of abiotic stress that affects quality and crop production. The high concentration of salts causes osmotic, ionic and oxidative stresses in plants including tomato[1,2].

Olive mill wastewater (OMW) has a chemical composition that can have a biostimulant effect on crops because it has a high content of phenolic compounds which have an antioxidant capacity[3].

The aim of this work was to evaluate the efficacy of the foliar application of olive mill wastewater to alleviate the negative effects of salt stress in tomato

METHOD

The **tomato seedling** (cv Cherry) were grown in the greenhouses of the University of Alicante in hydroponics in controlled conditions (Temperature: 18ºC/25ºC (night/day) and relative humidity 60%).

Oil mill wastewater

- It belongs to an olive mill in Cocentaina (Alicante, Spain) and is from the washing of three different species of olive.
- Four treatments were performed: normal control (without applying OMW), saline control (50 mM NaCl without applying OMW), OMW-1 and OMW-2 (50 mM NaCl and foliar application of OMW with 0.27 mM and 0.54 mM total phenols, respectively).

RESULTS & DISCUSSION

- The OMW-1 treatment showed an increase in fresh weight by 25% and in dry weight by 19% and a 14% reduction in proline concentration compared to the saline control, while there was no effect on transpiration intensity.

- The OWM-2 treatment improved fresh weight by 8% but not dry weight and did not reduce proline concentration. In addition, transpiration intensity was excessive (51% higher than the normal control), which could have caused damage to the leaf cuticle.

Table 1. Parameters of the characterization of olive mill wastewater with standard deviation.

Characterization of olive mill wastewater	
pH	4.63 ± 0.06
CE (dS/m)	3.51 ± 0.02
Total phenols (mg GAE/L)	371 ± 12
Antioxidant activity (µmol Trolox/ mL sample)	466 ± 9
TOC (g/L)	5.0 ± 0.5
Dry residue 110ºC (mg/L)	9.2 ± 0.3

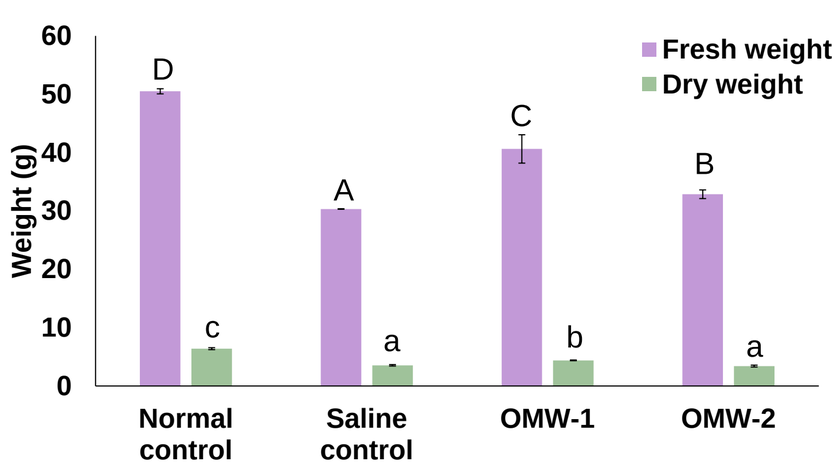

Fig 1. Fresh and dry weight of tomato plants. Means with the same letter indicate that there are no significant differences in the Duncan test (p ≤0.05). The bars show the standard deviation of the mean (n=3).

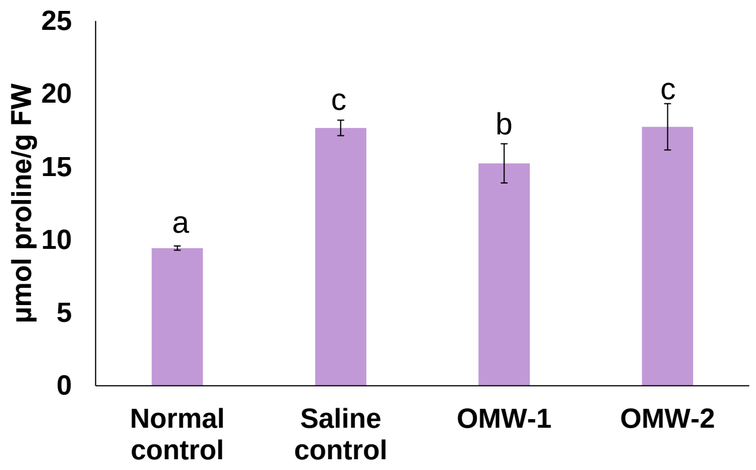

Fig 2. Proline in tomato plants. Means with the same letter indicate that there are no significant differences in the Duncan test (p ≤0.05). The bars show the standard deviation of the mean (n=3).

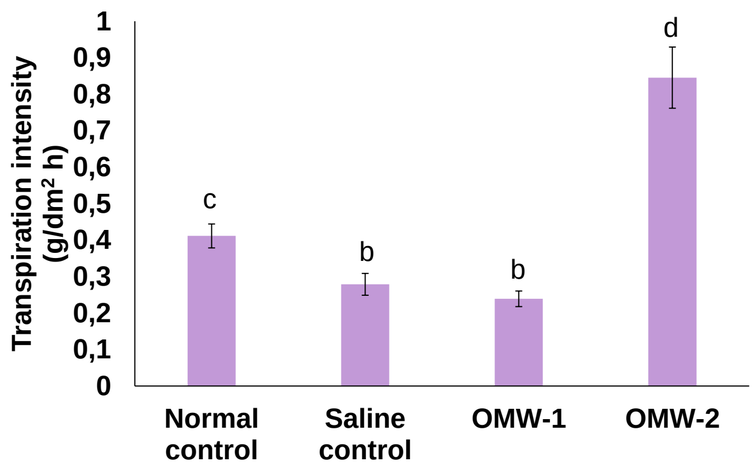

Fig 3. Transpiration intensity in tomato plants. Means with the same letter indicate that there are no significant differences in the Duncan test (p ≤0.05). The bars show the standard deviation of the mean (n=3).

CONCLUSION

It is concluded that the treatment OMW-1 showed higher efficacy as a biostimulant reducing the effects of salinity on the tomato crop than the treatment OMW-2 which is not suitable for foliar application due to the high increase in transpiration intensity. Further studies varying parameters such as total phenol dose are needed to continue evaluating the biostimulant effect of OMW.

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