IOCAG 2025 Conference

The 3rd International Online Conference on Agriculture

22–24 October 2025 | Online

MDPI

Evaluation of olive mill wastewater as a biostimulant for wheat growth under salinity stress

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

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

INTRODUCTION & AIM

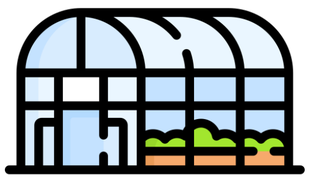
Wheat is a major global crop, essential for both human consumption and animal feed, but its productivity is increasingly threatened by abiotic stresses such as salinity from poor agricultural practices[1].

At the same time, the toxic olive mill wastewater (OMW) poses an environmental challenge, making its recovery crucial for reducing impact and promoting a circular economy[2].

The aim of this work was to evaluate the efficacy of the foliar application of olive mill wastewater as a potential biostimulant for wheat grown under salinity conditions.

METHOD

Wheat plants (*Triticum aestivum* L.) were grown in the greenhouses of the University of Alicante (Tª: 18/25ºC (night/day) and RH 60%).



Olive mill wastewater

- It belongs to an olive mill in Cocentaina (Alicante, Spain).
- Its application was based on dilutions of the concentration of phenolic compounds (TPC) it contained.

Plant treatments

- Normal control
- Saline control (100 mM NaCl)
- OMW-1, 2, 3: (0.050, 0.125, 0.25 mM TPC)
- OMW-1S, 2S, 3S: (TPC + salinity 100 mM NaCl)

RESULTS & DISCUSSION

- **Fresh weight** increased notably in OMW-3 plants compared to the normal control, but all saline plants (OMW-1S, OMW-2S, OMW-3S) showed important reductions.
- **Stem length** remained similar to the normal control in all OMW treatments under non-saline conditions. Saline plants (OMW-2 and OMW-3) did not differ from the saline control, while OMW-1S significantly improved stem length.
- **MSI** improved only at the highest dose (OMW-3) under non-saline conditions. Under salinity, no treatment improved MSI.

Table 1. Parameters of the characterization of OMW with standard deviation.

Characterization of OMW	
pH	4.63 ± 0.06
CE (dS/m)	3.51 ± 0.02
Total phenolic content (mg GAE/L)	371 ± 12
ABTS (µmol Trolox/ mL sample)	466 ± 9
TOC (g/L)	5.0 ± 0.5
Dry residue 110ºC (mg/L)	9.2 ± 0.3

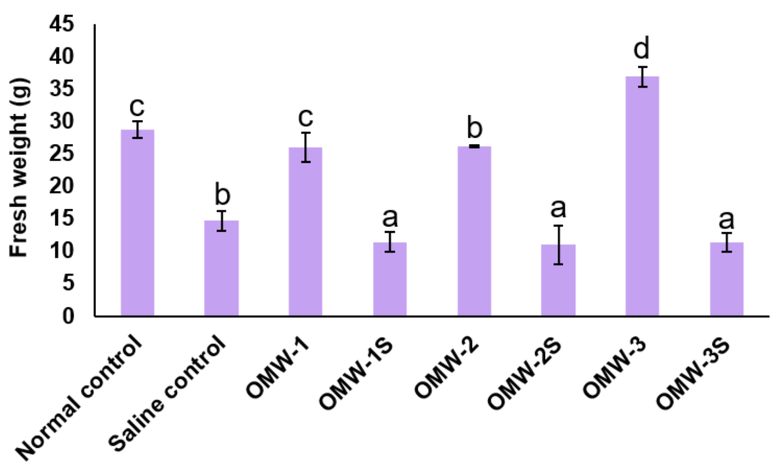


Fig. 1. Fresh weight of weight plants. Means with the same letter indicate that there are no significant differences in the Duncan test (p ≤0.05). The bars show the standard deviation of the mean (n=3).

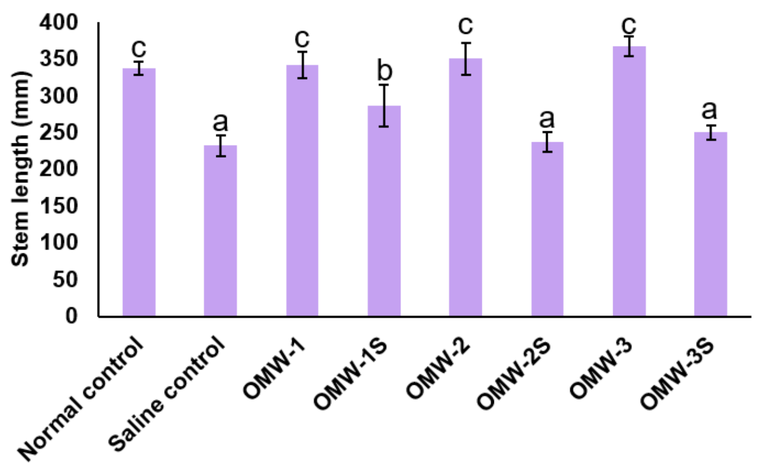


Fig. 2. Stem length of weight plants. Means with the same letter indicate that there are no significant differences in the Duncan test (p ≤0.05). The bars show the standard deviation of the mean (n=3).

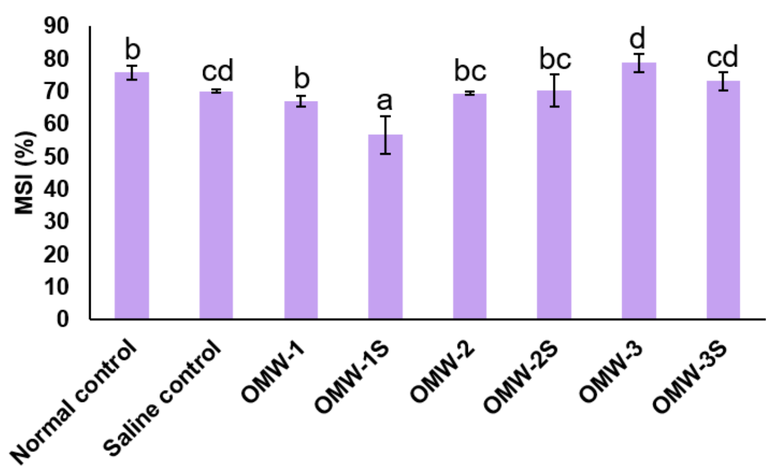


Fig. 3. MSI of weight plants. Means with the same letter indicate that there are no significant differences in the Duncan test (p ≤0.05). The bars show the standard deviation of the mean (n=3).

CONCLUSION

- It is concluded that, under saline stress conditions, the efficacy of OMW as a biostimulant is limited. In contrast, under non-saline conditions, OMW showed positive effects. Specifically, the highest dose (OMW-3) improved MSI and fresh weight parameters, although stem length showed no differences from the normal control.
- In the same way, further studies are necessary under salinity stress to better evaluate the biostimulant potential of OMW.

REFERENCES

1. Spada M, Marín-Sanz M, Bigini V, Quagliata G, Coppa E, Barro F, Savatin D, Ruggeri R, Sestili F, Rossini F, Astolfi S. Use of biostimulants for water stress mitigation in two durum wheat (*Triticum durum* Desf.) genotypes with different drought tolerance. *Plant Stress*. **2024**, *14:* 100566.

2. Jamrah, A.; Al-Zghoul, T.M.; Darwish, M.M. A comprensive review of combined processes for olive mill wastewater treatments. *Case Stud. Chem. Environ. Eng*. **2023**, 8:100493.