

Effect of Hydrogel and Olive Mill Wastewater on Germination and Seedling Growth of Cress as Bioindicator

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Problem and Objective

- Hydrogel has been applied as an amendment product to increase soil's water holding capacity. Nevertheless, studies suggested that depending on the hydrogel's base material and its application might result in phytotoxic effects.
- As hydrogel and olive mill wastewater (OMW) are irrigation-related elements, the interaction between both and its subsequent effect on plant growth requires studying.
- This study aims to test the potential interaction between the hydrogel and diluted OMW as moistening solution and its subsequent effect on germination and seedling growth of cress (*Lepidium sativum*).

Material and Methods

- Hydrogel „H9“ and „VH 26“ were developed and manufactured by the Aachen University of Applied Sciences, Institute for Applied Polymer Chemistry.
- OMW was sourced from Oleic Bovera, SL, Lleida, Spain.
- Germination tests with cress seeds according to DIN EN 16086-2 were conducted.
- Each hydrogel type was mixed with soil sample at a hydrogel-mixing ratio of 0.2% (w/w), and the mixtures were used as growing media. The OMW was diluted with water to OMW concentrations of 10-, 25- and 40% (v/v), and the solutions were used as moistening solutions.
- After 72 hours, the germination percentage was calculated, and the seedlings' root length (SRL) were determined using SmartRoot plugin from ImageJ software.

Results

- The germination percentage was not affected by hydrogel addition, independent of the used moistening solutions.
- No phytotoxicity effect was observed within each of the growing media, at any tested OMW concentration.

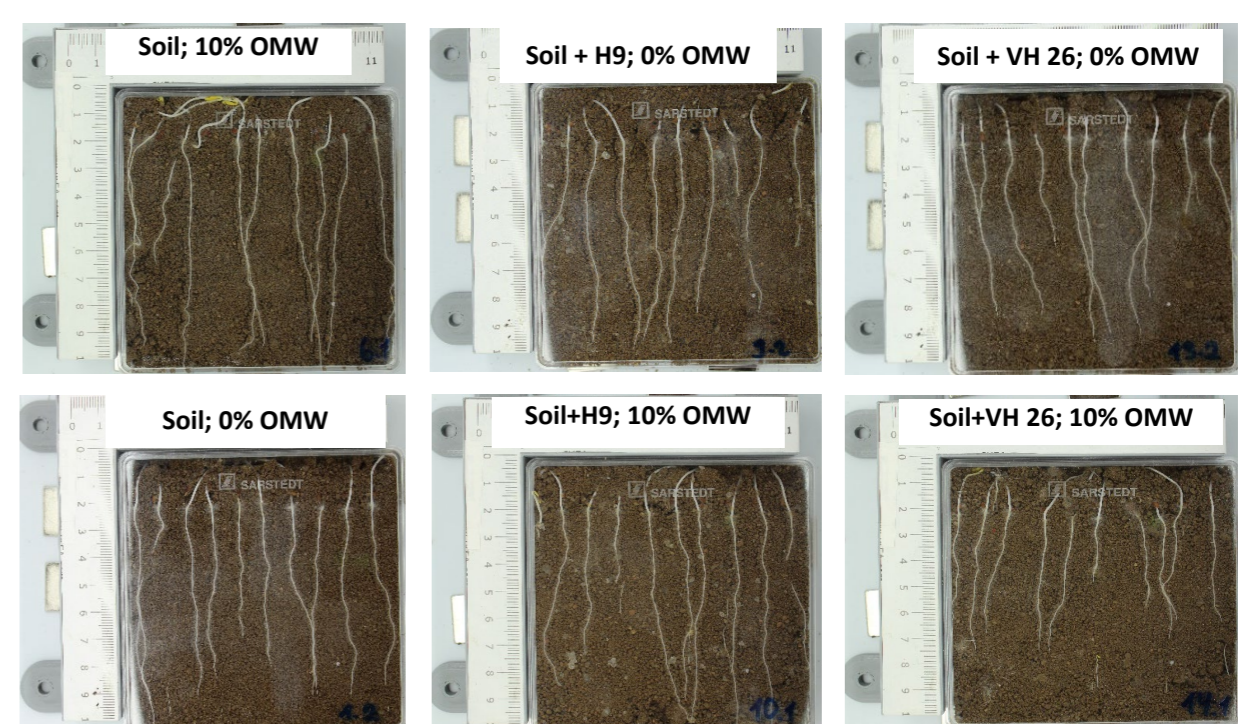


Fig 1. Cress seedlings after 72 hours germination period on soil mixed with H9 and VH 26 hydrogel, which was moistened with diluted OMW (10%, v/v).

- The SRL of the samples with VH 26 hydrogel at OMW concentrations of 10- and 25% were significantly lower than those with H9 hydrogel.

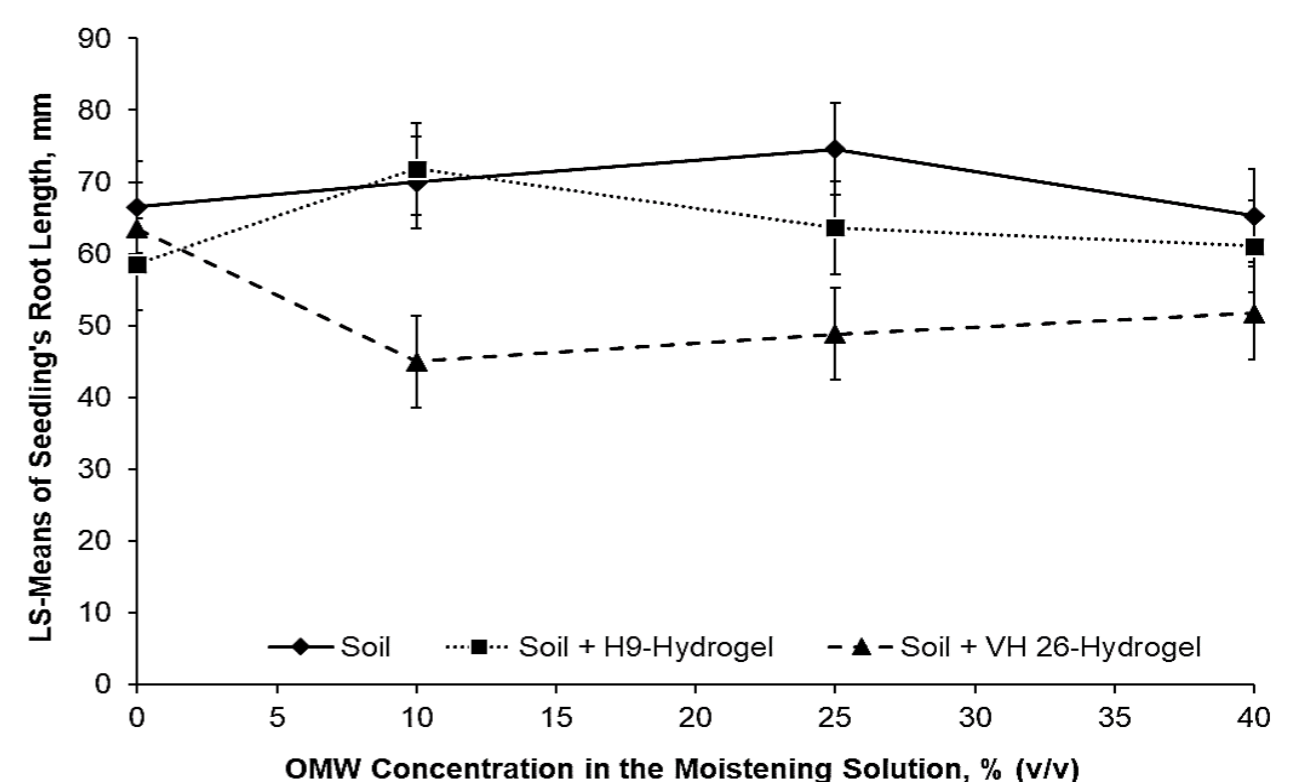


Fig 2. Effect of increasing OMW concentration in the moistening solution on seedling root length. The vertical bars represent the 95% confidence interval.

Conclusions

- The tested hydrogel types did not have any phytotoxic effect on cress germination and seedling growth.
- Dilution of OMW, especially those containing low phenolic content, could be a solution for its agricultural use.