



Tropentag, September 15-17, 2021, hybrid conference

“Towards shifting paradigms in agriculture
for a healthy and sustainable future”

Phytotoxicity Effect of Olive Mill Wastewater (OMWW) on Cress Germination

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Abstract

The hot weather conditions in the Fès-Meknès region of Morocco lead to high water evaporation rates, nutrient loss from soil and the enrichment of dissolved salts on the soil surface. On the other hand, the region is one of the biggest olive oil producers in the country, which generates considerable amounts of olive mill wastewater (OMWW). The OMWW is inadequately stored or discharged into the environment without any treatment. Although OMWW may present an environmental risk because of its phytotoxic effects due to the high polyphenol content, among other reasons, its utilisation as a fertiliser and a biopesticide is still under investigation. In this study, the phytotoxic effect of OMWW on the growth of cress (*Lepidium sativum*) was semi-automatically evaluated by analysing RGB images taken from germination tests according to DIN EN 16086-2. The cress seeds were sown under soil or perlite as a medium, which contained 0% (control), 5% (equivalent to a field application of 20 t/ha), 10% (40 t/ha) and 15% (60 t/ha) of OMWW, respectively. After 72 h, digital images of the cress were obtained, and the seedling growth parameters were determined by SmartRoot plugin from ImageJ software. When soil was used, it was observed that the higher the OMWW concentration, the shorter the root and hypocotyl length of cress. Nevertheless, the germination rate was not significantly affected ($p < 0.05$). On the other hand, no difference between the 5% treatment and the control was found when perlite was used, while an OMWW concentration of 10% and 15% affected the root and hypocotyl length significantly at $p < 0.05$. Additionally, the results revealed a decrease in the cress seedling's fresh weight and dry matter content as the OMWW concentration was increased. This study shows the potential of using OMWW directly as a fertiliser and a soil amendment to improve soil properties and plantation yields.

Keywords: Natural resource, Soil substrate, Sustainable production, Waste management