



Does wastewater from olive mills induce toxicity and water repellency in soil?

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Olive oil mill wastewater is the effluent generated by the olive oil extraction process. It is the main waste product of this industry mainly being produced in the Mediterranean Basin. Because proper treatment options are rare it is often disposed into the environment, e.g. fields or wadies. Due to its high concentration of fatty acids and phytotoxic phenolic compounds and its high chemical and biological oxygen demand, olive oil mill wastewater becomes a serious environmental problem. In this screening study we investigated long-term effects of olive oil mill wastewater application on soil properties in several locations in the West Bank and Israel. We determined wettability via water drop penetration time and the contact angle as well as general soil properties including pH, EC, carbon content, and we conducted thermogravimetical analyses in order to characterize the impact of the waste water on the quality of soil organic matter.

Our results show that application of olive oil mill wastewater has various effects. We determined contact angles between 110 and 120° and water drop penetration times up to 1367 s indicating significant reduction in wettability. Furthermore, soil carbon and nitrogen content and water extractable organic matter increased as well as electric conductivity, which could be pointed out as a fertilizing effect. In contrast soil pH was significantly reduced. Conducting thermal analyses we observed an increase in the labile and refractory carbon fraction. Probably first one is responsible for induced water repellency. As a consequence the reduced wettability negatively affects soil quality. It would therefore be promising to minimize the hydrophobizing impacts without losing fertilizing effects of the olive oil mill wastewater.