Sustainable Management of Olive Mill Wastewater in Palestine: Challenges and Opportunities

Rashed Al-Sa`ed*
Institute of Environmental and Water Studies, Birzeit University, P.O. Box 14, Birzeit, Palestine

Extended summary
Olive processing, a traditional agricultural industry in Palestine, plays an important role in the Palestinian economy and rural development. However, sustainable management for olive oil mill wastewater (OMWW) is one of the crucial environmental challenges facing most Mediterranean countries including Palestine. The OMWW locally known as Zibar, is variable in characteristics and volumes rendering an environmentally sound, economically feasible, and practically easy treatment alternative. High organic and inorganic contents of hardly biodegradable and toxic materials, including diverse phenolic compounds makes OMWW difficult to treat. Spatial distribution of olive oil mills and their seasonal operation limit a centralized management system of the OMWW. This paper, a min-review, aims at updating the number, type, and distribution of olive mills in Palestine, the volumes and characteristics of OMWW, presenting the current treatment technologies, and identifies the most environmentally affected regions. Retrofitting of current treatment praxis and feasible treatment methods will be presented and discussed.

In Palestine, the annually produced OMWW (100000 m^3) experience improper treatment and disposal methods resulting in a major threat to the receiving environment with short and long term impacts. Current decentralized treatment systems for 300 small olive processing plants entail physical-chemical and biological treatment technologies with partial removal of pollution loads. The northern parts of Palestine have been defined as the most affected regions. In addition, there is a high possibility of soil and ground water pollution in regions of the North Eastern and Western aquifers where olive mills are heavily condensed. Measures to improve the present situation are necessary, especially in the most affected regions. Environmental protection laws are needed in terms of establishment and implementation in order to control the discharge of OMW and to put guidelines for proper pre or full treatment methods. In order to reduce the quantity of olive mill wastewater, process modification of the 230 full automatic mills (3-phase decanter) to 2-phase decanter is highly recommended. Studies on the reuse of OMWW should be encouraged using new biotechnological tools to extract valuable resources and utilize as a carbon source or animal feed processing.

Further investigations are still needed to explore hybrid innovative solutions aiming at environmentally sound and economically feasible OMWW treatment. Such systems should integrate pre-treatment systems (physical-chemical) prior biological unit operations (post-treatment stages). Finally, regional cooperation with other Mediterranean countries is essential to promote novel treatment technologies for sustainable treatment of olive mill wastewater.

*Corresponding author. Telephone: +972-2 298 2070, Fax: +972- 2 298 2120
E-mail address: rsaed@birzeit.edu (R. Al-Sa`ed)