

An innovative bioreactor for denitrification of nitrate-rich brackish groundwater using whey

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Abstract

The increasing water shortage in Palestine drives policy decision makers, industrial sector and the public to install both small and medium size desalination systems with high capital and increased annual running costs. Farmers are urged to use brackish groundwater and partially treated wastewater for agricultural irrigation. Soil salinization and groundwater pollution with nitrate and decreased soil fertility are just to name as side effects. Local innovative design and low-cost bioremediation technologies utilizing the biological denitrification process are specially needed in developing countries like Palestine. The aim of this research study is to design and operate a lab-scale denitrification system, a slurry bioreactor, to remove nitrate-using whey as a low-cost external carbon source for the heterotrophic denitrifiers.

The effectiveness of the slurry bioreactors in batch and continuous flow modus will be investigated under variable organic and inorganic volumetric loads. The results obtained will assist water utilities and decision makers in opting for environmentally sound and low-cost treatment technologies to remediate nitrate-rich groundwater. Improving both volume and quality of water resources in Palestine will enhance economic development and improve living standards, especially in Gaza strip.

Keywords: Denitrifiers, drinking water, waste recycling, whey, slurry bioreactor.