



A comparison study on the removal of suspended solids from irrigation water with pumice and sand–gravel media filters in the laboratory scale

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ABSTRACT

In this study, different bed materials in media filter systems were examined. For this purpose a laboratory experiment was established to determine the solids removal efficiency, total outlet flow volume and outlet flow velocity of pumice that has numerous open spaces, vesicles and irregular cavity, sand–gravel and combination of pumice and sand–gravel. In the experiment, two different filter column diameters (150 and 200 mm) and two different inlet flow pressures (100 and 150 kPa) were used. The results show that the total outlet flow volumes increased logarithmically as the filtration test period progressed, while the outlet flow velocities and the outlet concentrations of suspended solids decreased logarithmically for all filter types. Pumice media filters provided higher total outlet flow volumes and lower solid removal efficiency in comparison with sand–gravel media filters. However, the highest average solid removal efficiency was determined by pumice plus a sand–gravel media filter at 90.5%. The average outlet flow velocity value for this filter type was $34.2 \text{ m}^3 \text{ h}^{-1} \text{ m}^{-2}$, which was higher than the other filter types at the same experimental conditions. Pumice plus sand–gravel media filters increased the filtration period according to the sand–gravel media filters as well.

Keywords: Water treatment; Sediment; Media filters; Pumice; Sand–gravel; Physical clogging

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