



Removal efficiency of pressurized sand filters during the filtration process

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ABSTRACT

This study aims to evaluate the filtration process of a commercial sand filter operating at different filtration rates and different sand particle sizes. The second objective is to carry out sand filter efficiency evaluations and compare the standard sand filter method and the proposed method. Removal efficiency was analyzed in three filtration cycles, and determined by two methodologies: counting of particles in water at the inlet and outlet of the filtration system (standard method) and in sand bed layers (proposed method). An experimental module composed of three identical commercial sand filters was used with different sand particle sizes (G1 – 0.55 mm of sand effective diameter, G2 – 0.77 mm and G3 – 1.04 mm) and filtration rate combinations (20, 40, 60, and 75 m³ m⁻² h⁻¹), repeated for three filtration cycles (C1, C2 and C3), 4 h per cycle. The removal efficiency of sand filters increases as the filtration rate increases for the water quality used, and sand particle size decreases. Between the methodologies applied to evaluate filtration systems, the method using total suspended solids retained in sand (proposed method) has shown a greater potential when compared with the standard method. The evaluation methodology proposed provides a global and accurate evaluation of the process. This form of estimation does not have the representability problem punctual water samples collected during filtration have. In addition, it is a promising methodology for farmers and technicians to carry out equipment evaluations in the field.

Keywords: Drip irrigation; Water treatment; Granular bed; Sand filter

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