

Iron removal efficiency in irrigation water by a zeolite added to sand media filters

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ABSTRACT

Drip irrigation is characterized by a reduction of water use and energy consumption in agriculture. However, high levels of iron concentration in water have been a problem, due to emitter clogging. This work evaluated the efficiency of zeolite mixed with sand in media filters to remove bivalent iron (Fe^{2+}) from irrigation water. Initially, an experiment was conducted to test mixtures with different combinations of sand-zeolite, as well as contact time between the mixture and the irrigation water, in static conditions. It was possible to observe a reduction of 95% in iron concentration in the water when a mixture of zeolite and sand was used in a proportion of 1:3 in volume. After filters manufactured with polyvinylchloride pipes were built, 10 cm diameter and 55 cm long. They were filled up with a mixture of zeolite and sand in proportion of 1:3 in volume, to evaluate iron removal efficiency by the mixture under dynamic conditions. An iron removal efficiency of 98% was verified. Finally, the bivalent iron solution was passed through the mixture (1:3) and the output concentration didn't reach 50% of the input concentration even after passing 800 pore volumes, equivalent to 800 times the volume of pores inside the column. These results allow us to conclude that the use of Control M.F. 574 zeolite can successfully remove bivalent iron from water at concentrations up to 5 ppm.

Keywords: Water treatment; Drip irrigation; Adsorptive filtration

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