



Calcium nitrate miscible displacement at different concentrations in packed soil columns

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Studies on miscible displacement provide us with rational means to understand the important physical phenomena involved leaching in soils, fertilizers, movement of ions and other similar processes. With current environmental concerns and the need to understand the processes that govern movement of water and solutes in soil, studies are needed to allow increasing the efficiency of input use in agriculture that somehow can mitigate the impact of activities of this sector on groundwater contamination. Contamination of soil and groundwater and surface water in areas with fertilizer application and reuse of effluent is closely linked to materials chemical characteristics, and retention and transmission of water and soil solutes. Solute mobility in soil is inversely related to their adsorption to solid fraction or to environmental conditions that favor ions precipitation. Ion adsorption to soil exchange complex makes ion maintains exchange with the soil solution, providing once their retention by the solid fraction, another its availability in aqueous medium. Nitrate leaching is a physical phenomenon, favored by low energy involved in adsorption to soil particles and also by its high solubility in water. This high solubility and the weak interaction with soil matrix to allow anion follow the wetting front. Therefore, the objective was determine nitrate transport parameters in soil, through Breakthrough Curves (BTC) development under conditions of disturbed soil samples (saturated soil and steady state conditions) in columns (20.0 cm in height and 5 cm in diameter), by calcium nitrate solution application at two concentrations, 50 and 130 g m⁻³ NO₃⁻, in two tropical soil types, Yellow Oxisol (S1) and Anfisol (S2). Research was carried out in laboratory. Transport parameters for both soils and nitrate concentrations were obtained by numerical fit using STANMOD software, by the inverse modelling. Results showed predominance of convective transport in S1, which had a higher Peclet number (*P*) at concentration 50 g m⁻³. There was no difference in the others parameters due to different nitrate concentrations. It was observed a higher nitrate leaching on S1.