

Study of Nitrogen Species Fate and Transport in Subsurface: To Assess the Impact of Wastewater Irrigation

Authors : C. Mekala, Indumathi M. Nambi

Abstract : Nitrogen pollution in groundwater arising from wastewater and fertilizer application through vadose zone is a major problem and it causes a prime risk to groundwater based drinking water supplies. Nitrogenous compounds namely ammonium, nitrate and nitrite fate and transport in soil subsurface were studied experimentally. The major process like sorption, leaching, biotransformation involving microbial growth kinetics, and biological clogging due to biomass growth were assessed and modeled with advection-dispersion reaction equations for ammonium, nitrate and acetate in a saturated, heterogeneous soil medium. The transport process was coupled with freundlich sorption and monod inhibition kinetics for immobile bacteria and permeability reduction due to biomass growth will be verified and validated with the numerical model. This proposed mathematical model will be very helpful in the development of a management model for a sustainable and safe wastewater reuse strategies such as irrigation and groundwater recharge.

Keywords : nitrogen species transport, transformation, biological clogging, biokinetic parameters, contaminant transport model, saturated soil

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