



Infiltration measurements and modeling in a soil-vertical drain system

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Severe water logging problems occur in rubber tree plantations in NE Thailand during the rainy season and create adverse conditions for the development of the trees. Moreover this situation contributes to a waste of scarce rainfall and reduce its efficiency, as 50% is lost by hypodermic water flow and superficial runoff. The presence of a clayey layer at 1m depth with low permeability, hindering the water infiltration that led to the occurrence of a perched water table. In order to drawdown the water level of the perched water table and to increase the efficiency of the rainfall by storing water in the underlying bedrock a vertical drainage system was developed. In order to test the feasibility of this solution we chose to use the numerical modelling of water flow in soil and to test different set-ups (size and spacing between the drains). The objective of this study was to characterise the hydraulic properties and of the soil-drain system in a rubber tree plantation. Therefore an experiment was set up in rubber tree plantation at Ban Non Tun, Khon Kaen Province (Northeast of Thailand). Infiltration experiments around the vertical drains with single ring of 1m diameter, were conducted in three different locations to measure infiltration rate. The infiltration experiments were also monitored with two complementary geophysical methods (ERT and GPR) to assess the progression and at the geometry of the wetting front. The model Hydrus2D was used to adjust the computed infiltration curves and water level in the drain to the experimental data, by fitting effective unsaturated hydrodynamic parameters for the drain. These parameters were used to calibrate the model and to perform further predictive numerical simulations.