EVALUATION OF INFILTRATION MODELS FOR MINERAL SOILS
WITH DIFFERENT LAND USES IN THE TROPICS

Abstract

The aims of this study were to evaluate five infiltration models for mineral soils in the tropics with different land use types, such as settlements, plantations, rice fields, and forests. The infiltration models evaluated were Green–Ampt, Kostiakov, Kostiakov–Lewis, Philip, and Horton. The research was conducted at the Amprong watershed, Malang, Indonesia. The infiltration rate of the thirteen soil samples was analysed. The infiltration was tested using Turf-Tech infiltrometer. Moreover, each soil sample was tested in terms of the bulk density, specific gravity, porosity, soil moisture, and soil texture. The results of the study indicate that there is no significant difference ($\alpha = 5\%$) in the infiltration rate among the five models of infiltration. The infiltration rate in the study site was considered fast. Three models exhibiting the best performance are Kostiakov, Kostiakov–Lewis, and Horton model, respectively. The highest infiltration rate occurred in the forest land use while the lowest occurred in the rice field land use. The results of this study suggest that the infiltration model parameters correlate closely with the initial infiltration rate ($f_0$) and the final infiltration rate ($f_c$). In other words there is a correlation between the soil's ability to absorb water (representing the capillary force or horizontal flow) at the beginning of the infiltration ($f_0$) and the gravity or the vertical flow upon reaching the final infiltration rate ($f_c$).

Key words: infiltration models, land use, mineral soil, tropical climate