ANALYSIS OF METHODS TO ESTIMATE SATURATED HYDRAULIC CONDUCTIVITY

ABSTRACT

To study soil water movement, saturated hydraulic conductivity and infiltration capacity are important parameters. Frequently used methods to measure this characteristics are: constant head permeameter , inverted auger hole, double ring infiltrometer, tension infiltrometer and rainfall simulation. During field and laboratory tests evidence shows that macropores, microfauna or cracks play an important role. Hydraulic conductivities increase as those features are present. As a consequence, the estimation of Ks using different methods shows a very significant variability which is generating doubts at the time of selecting a value of Ks for a practical application. In this study, a set of data for 7 degraded zones in the south of Ecuador has been compiled. In these zones the mentioned measurement methods have been applied for each case with 3 repetitions. All experiments have been made on the same soil group. The relations between double ring infiltrometer and inverted auger hole and between tension infiltrometer and the rainfall simulation respectively, have been demonstrated statistically . The relation between the contact surface of the sample and the measured saturated hydraulic conductivity is explained in mathematical terms using a logarithmical expression. The rainfall simulation, the constant head permeameter, double ring infiltrometer and inverted auger hole methods show dependency with the surface area of the sample. The estimation of Ks increases with increasing surface area. The tension infiltrometer method seems to be independent from the area. This method is the best one for the determination of saturated hydraulic conductivity of degraded soils. The sample size for a test to be representative should be at least 0.75m².