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Abstract
Hydraulic conductivity is a key parameter which influences hydrological processes of infiltration, surface and subsurface runoff. Vegetation alters surface characteristics (e.g., surface roughness, litter absorption) or subsurface characteristics (e.g. hydraulic conductivity). Field infiltration experiment of a single ring permeameter is widely used for measuring soil hydraulic conductivity. Measurement equipment is a simple single-ring falling head permeameter which consists of a hollow cylinder that is simply inserted into the top soil. An optimization method on the basis of objective of minimum error between the measured and simulated water depths in the single-ring is developed for determination of the soil hydraulic parameters. Using the single ring permeameter, we measured saturated hydraulic conductivities (Ks) of the red loam soil with and without vegetation covers on five hillslopes at Taoyuan Agro-Ecology Experimental Station, Hunan Province of China. For the measurement plots without vegetation roots, Ks value of the soil at 25cm depth is much smaller than that of surface soil (1.52×10-4 vs. 1.10×10-5 m/s). For the measurement plots with vegetation cover, plant roots significantly increase Ks of the lower layer soil but this increase is not significant for the shallow soil. Moreover, influences of vegetation root on Ks depend on vegetation species and ages. Ks value of the Camellia is about three times larger than that of seeding of Camphor (2.62[U+F0B4]10-4 vs. 9.82[U+F0B4]10-5 m/s). Ks value of the matured Camellia is 2.72[U+F0B4]10-4 m/s while Ks value of the young Camellia is only 2.17[U+F0B4]10-4 m/s.

Key words: single ring permeameter; soil hydraulic conductivity; vegetation