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For individual trees with the same diameters at breast height, canopy tree species may cause more infiltration than do smaller tree species

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Infiltration is among the main factors determining the occurrence of rainfall-induced landslide. Trees promote infiltration by penetrating soil surfaces with roots, so that trees' effects on infiltration can be estimated with their root collar diameters (RCDs). Although vegetation data collected before landslides can provide important clues to identify trees' roles in slope stability, these data record only trees' diameters at breast height (DBHs) rather than RCDs. Therefore, there is a need to establish regression models with which RCDs can be estimated from DBHs. The study site is located in the 25-ha Lianhuachih Forest Dynamics Plot, central Taiwan. This plot is established in 2007 and 1.22 ha of its vegetation is removed by landslides in 2008. At least 10 individuals which DBHs range from 1 cm to species-specific maximum DBHs were sampled for each of the ten most dominant tree species (including 5 canopy, 4 sub-canopy and 1 shrub species) to measure their DBHs and RCDs. Regression analyses showed that the DBH-RCD relationships of these species are all linear (R= a•D; R, RCD; D, DBH; a, the scaling factor) ($R^2 > 0.75$). The scaling factors differ significantly between species (F test, $p < 0.001$). Species with greater maximum DBHs have higher scaling factors (Pearson correlation, p= 0.005). That is, with the same DBHs, canopy tree species have higher RCDs than do sub-canopy and shrub species. If trees' effects on infiltration promotion is a positive linear function of their RCDs, in a given DBHs, individuals of canopy species can cause more infiltration than do those of smaller tree species.