



## Building regression models to estimate tree traits influential to slope stability

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**ABSTRACT** The above-ground (shoot) system of trees can affect slope stability through effects of infiltration facilitation, surcharge and wind loading. The amount of stem flow that infiltrates into soils is determined by diameter at root collar (DRC) of trees. Tree weight (surcharge) is a function of their heights (H) and diameters at breast height (DBH). Wind loading is related to crown area (CA) of trees. To save efforts for measuring all of these traits, we aimed to build regression models which allow researchers to estimate the other three traits with DBH. The study site was located in the Lienhuachih Forest Dynamics Plot, central Taiwan. DBH, DRC, CA and H of 20-30 individuals for the 18 most dominant tree species were measured. Trees which have been snapped off were excluded. Results showed that the regression models between DRC and DBH were linear. The models of CA against DBH and H against DBH was best built with allometric models, indicating that CA and H stop to increase with DBH once DBH reach to a certain size. In terms of model performance, the models of DRC against DBH was best ( $r^2= 0.48- 0.97$ ), followed by those of H against DBH ( $r^2= 0.32- 0.89$ ). The relatively poor performance of CA against DBH models ( $r^2= 0.15- 0.93$ ), especially for light-demanding tree species, indicated the need of incorporating light environment (i.e. crown illumination index) into regression analysis.

Key word□allometric model, broad-leaved forest, diameters at breast height, landslide, Lienhuachih

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