



## Root strength comparison between early and late successional trees in a subtropical forest

Cang-Wei Chen<sup>1</sup>, Guo-Zhang M. Song<sup>2</sup>, Li-Wan Chang<sup>3</sup>, Chien-Jui Ko<sup>4</sup>, Hsin-Tien Lee<sup>4</sup>, Hung-Yen Hu<sup>4</sup>, and Jie-hao Tseng<sup>4</sup>

<sup>1</sup>Department of Soil & Water Conservation, National Chung Hsing University, Taichung, Taiwan  
(eric246right@yahoo.com.tw)

<sup>2</sup>Department of Soil & Water Conservation, National Chung Hsing University, Taichung, Taiwan  
(mikesong@email.nchu.edu.tw)

<sup>3</sup>Taiwan Forestry research institute

<sup>4</sup>Department of Soil & Water Conservation, National Chung Hsing University, Taichung, Taiwan

### ABSTRACT

Slope stability of forested areas is often determined by tree root strength. After landslides, the early successional species emerged first, followed by the late successional species. This study aimed to examine whether tree root strength varies as tree species change along with the succession sequence. The study site is in the Lienhuachi Experimental Forest in central Taiwan, where multiple landslides happened in 2008. Three dominant early (*Mallotus paniculatus*, *Sapium discolor*, and *Schefflera octophylla*) and three late successional species (*Cryptocarya chinensis*, *Engelhardtia roxburghiana*, and *Randia cochinchinensis*) were sampled to conduct the single-root-pull-out tests in the field. Root strength which varies with root diameters was estimated with the Root Bundle Model with the root-failure Weibull survival function (RBMw). Results showed that the overall root strength of the early successional tree species were higher than that of late successional species only when root diameter was lower than 5.44 mm. However, among the six species, the root strength of *Sapium discolor*, an early successional species, was highest and the species with the lowest root strength was a late successional species (*Engelhardtia roxburghiana*). To precisely estimate tree effects on slope stability, our results highlighted the need to collect root strength data specifically for each species, even though it will be a daunting task for areas rich in tree diversity.

**Keyword: landslide, Root Bundle Model, vegetation succession**