Which biotic drivers can better explain the variability of root mechanics of tropical tree species?

Zhun Mao, Yan Wang, Jérome Nespoulous, Roy C. Sidle, Alexia Stokes

SESSION 8 – MICROBIAL ECO-INTERACTIONS WITH SOILS

Keynote - David Airey

SBEE2 – Bio-cementation for ground improvement

D.W. Airey, Y. Duraisamy

School of Civil Engineering, University of Sydney, NSW 2006, Australia

Bio-cementation has been suggested as an environmentally safe method of ground improvement that makes use of in-situ soil and can avoid disruption to existing infrastructure. The concept is to use bacteria with suitable nutrients to precipitate cementing agents within the soil, a process known as microbially induced calcite precipitation (MICP). The most widely investigated approach has been to use the bacterium *sporosarcina pasteurii* in combination with urea and a calcium source to precipitate calcium carbonate. Several laboratory studies have confirmed that substantial increases in soil strength and stiffness are possible in sandy soils. The viability of the technique and the methods for creating bio-cementation in finer grained soils have received much less attention. The paper will provide a review of the bio-cementation process, discuss procedures for creating bio-cemented soil and discuss the strengths that can be achieved.

SBEE37 – Which biotic drivers can better explain the variability of root mechanics of tropical tree species?

Zhun Mao, Yan Wang, Jérôme Nespoulous, Roy C. Sidle, Alexia Stokes et al.

INRA, UMR AMAP, Boulevard de la Lironde, 34398 Montpellier Cedex 5, France

Background and Aims

Little quantitative information is available on the protective role of tropical species on slope sites prone to erosive phenomena. One of the key parameters to evaluate of species' capabilities in erosion mitigation is root individual scale mechanical traits. We explored, for the first time, the variability of root mechanics of several dominant species in tropical ecosystems.

Methods

We carried out ex situ experimental tests on roots of four common tropical tree species, i.e. Barringtonia fusicarpa Hu, *Pometia pinnata* J.R. Forst. & G. Forst., *Baccaurea ramiflora* Lour. and *Pittosporopsis kerrii* Craib as model species in Xishuangbanna forests, Yunnan, China. Tensile strength and modulus of elasticity, as two of the most important root mechanic traits were estimated.

Results and Conclusions

Root mechanics vary greatly depending on root size and tree species. And root size the primordial factor determining the variability of root mechanics, especially for very fine roots. The significant disparity of root mechanics between the four tree species suggests that the use of generic equations in soil stability modelling procedures may not be relevant in tropical ecosystems that possess a high species richness level. General discussions are provided concerning the disparity of geomorphological modelling between temperate and tropical forests.

Keywords: root mechanics, tensile strength, modulus of elasticity, tropical, forest.