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Suitability of *Eugenia Oleina* in Tropical Slope as Bio-anchorage System

Youventharan Duraisamy[1,a*], Rokiah Othman[1,b], Mohd Arif Sulaiman[1,c], Ramadhansyah Putra Jaya[1,d] and Siti Noor Linda Taib[2,e]

[1]Universiti Malaysia Pahang, Faculty of Civil Engineering Technology, Pahang, 26300, Malaysia

[2]Universiti Malaysia Sarawak, Department of Civil Engineering, Kuching, 94300, Malaysia

[a]youventharan@ump.edu.my, [b]rokiah@ump.edu.my, [c]mdarif@ump.edu.my, [d]ramadhansyah@ump.edu.my, [e]tlinda@unimas.my

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Abstract. Landslide is a major geological hazard and poses high risk to most countries in the tropical regions. This problem is more severe in places like Malaysia where residual soil is abundant. High temperature and humidity will easily disintegrate soil particles and therefore loosen the bonding between the soil and the root system. The main goal is to elucidate the interaction mechanism of bio-inspired soil anchorage system to enhance bonding between residual soil matrix in tropical region. Hence, this research aims to establish correlation between the pattern of root and its tensile strength to reinforce tropical residual slope. Basic soil property tests and classification protocols were carried out in the laboratory. Root tensile test results from the laboratory was correlated with field pull-out test data. Slope stability in the area where the plant roots were introduced have been disturbed. The factor of safety of slope with bio-anchorage system was one third of the slope with grass. The findings provide the best solution from the bioinspired soil anchorage system for tropical slope. Hence, the plant species that works well in residual soil for the purpose of reinforcing tropical slope was identified and recommended. As a result, many serious landslides and slope failures in residual soil could be avoided in the tropical region. Therefore, slope stabilization technique such as the bio-inspired soil anchorage system once established can reduce the dependency on conventional concrete wall.

Introduction

For many decades, researchers have been continuously searching for the right balance in eco-system and modernization. One good example is, Demenois et al. [1] examined how five distinct tropical plant communities modified soil aggregate stability along a successional vegetation gradient on a Ferralsol soil in New Caledonia. This study demonstrated that the presence of particular plants, *Costularia arundinacea*, *Garcinia amplexicaulis* and *Myodocarpus angustialatus* generally improved soil aggregate stability and these species could be considered for ecological restoration on Ferralsols. Ettbeb et al. [2] and Bordoloi et al. [3] summarized on how the plant communities significantly increase aggregate stability in the early stages of succession. Unfortunately, none of these plants are commonly used in Malaysia and in the tropical region.

Apart from that, Jourgholami et al. [4] examined the role of fibrous roots and tap roots in stabilizing soils against erosion due to concentrated flows of surface runoff. The researcher found that the effectiveness of plant roots in controlling concentrated flow erosion rates depended on the apparent soil cohesion and that fine root systems were most effective in preventing flow erosion in non-cohesive soils while tap root systems were most effective in cohesive soils. Similarly, a laboratory experiment was conducted by Oorthuis et al. [5] to find the relationship between the vegetation parameters and thermos hydraulic behaviour of soil. These are the results that practitioners will find extremely useful in efforts to mitigate erosion in these two soil types. However, findings from these papers are more to temperate region and will not be useful for local applications especially in Malaysia.