

ชื่อเรื่อง

**An Assessment of Strength Properties of Vetiver Grass Roots in Relation to Slope Stabilization**

ชื่อผู้วิจัย

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**Abstract**

It is well reported that the root properties of vetiver grass can help reduce soil erosion and enhance slope stability when properly planted on soil slopes. In general, the root properties can be subdivided into root strength properties and root morphological parameters. Some previous studies on vetiver plant have elaborated the root morphological parameters qualitatively. However, the strength properties of vetiver roots, which also play a significant role in terms of erosion control and slope stabilization, have not yet been understood adequately. Vetiver is considered as a very deep-rooted penetrating grass variety which develops a fibrous profusely grown root system. The root penetration is mainly vertical and sometimes up to 3.6 m deep depending on the soil conditions. When a root penetrate across a potential shear surface in a soil profile the distortion of the shear zone develops tension in the root; the component of this tension tangential to the shear zone directly resist shear, while the normal component increases the confining pressure on the shear plane. Therefore, it is essential to understand about the root tensile properties in the process of evaluating a plant species as a component of slope stabilization.

This paper intends to discuss about root tensile strength of vetiver grass and its contribution to soil strength increase by means of experiments on root tensile strength determinations and root permeated soil shearing, which is a part of an ongoing research work specially design to assess both root strength properties and root morphological parameters in relation to slope stability and erosion control. Unbranched sections of vetiver roots in different diameter classes up to about the average maximum root diameter (3.5 mm) were tested in order to determine the tensile strength. The results were compared with

the root tensile strengths of other tree species which were obtained from previous studies, and the effect of root diameter on the tensile strength of vetiver roots was established. To obtain the contribution of root tensile strength to the shear strength of soil, large scale direct shear tests were performed in  $0.5 \times 0.5 \times 0.5$  m<sup>3</sup> root permeated soil blocks along with root free soil blocks with same soil properties. The difference between the shear strength values of root permeated and root free soils, the shear strength increase due to the presence of roots, were then analyzed with the root area ratio, root diameter, root orientation and eventually with the root tensile strength to elaborate the significance of root tensile strength of vetiver grass and its influence in soil strength increase.