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Roots Tensile Strength of Native Tree Species for Soil Bioengineering in Northeastern Mexico

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Abstract

In recent years the soil bioengineering effect of vegetation on slope stability has been playing a very important role. However, for many causes such as small-scale earthquakes or the increasing heavy rainfall extreme events, many slopes are in a potentially unstable condition, so that movements can be started easily including the study area. The mechanical properties of the root systems (maximum force to root breakage and tensile strength) of native species in three diametric groups were analysed for a potential use as soil bioengineering elements. Hypothesis were that maximum force to breakage of the roots is influenced by diameter and tensile strength of roots is different between species of the two different ecosystems: Tamaulipan thornscrub and Pine-oak forest. Tamaulipan thornscrub (Site 1): Acacia berlandieri, Cordia boissieri, Acacia rigidula, Havardia pallens, Acacia farnesiana; Pine-Oak UANL forest (Site 2): Quercus rysophylla, *Pinus pseudostrobus*, Quercus canbyi, Quercus polymorpha and Arbutus xalapensis. The species considered were selected based on their native characteristics and widespread existence on slopes. Regarding tree forest species, the tests were conducted with the Universal Testing Machine Shimadzu type SLFL-100KN.: Acacia berlandieri showed the maximum value of Maximum force to breakage (N) 871.87 N and the minimum value of Maximum force to breakage (N) was observed for Cordia boissieri. However, the results of tensile strength showed the following ascending order: C. boissieri < Arbutus xalapensis, *Pinus pseudostrobus*, Havardia pallens, < Quercus polymorpha < Acacia farnesiana < Quercus canbyi < Quercus rysophylla < Acacia rigidula < Acacia berlandieri. It will be explained the relationship between tensile strength and diameters of studied species. The results of this study explained the relationship between tensile strength and diameters of the studied species. Acacia berlandieri showed the highest tensile strength in all species of the two ecosystems, in the diametric group I (0 to 2.99mm).

Keywords: Pinus-Quercus., root, slope stability, tensile strength, thornscrub species

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