Geophysical Research Abstracts
Vol. 15, EGU2013-7816, 2013
EGU General Assembly 2013
© Author(s) 2013. CC Attribution 3.0 License.

Determination of increase in shear strength of soil reinforced with plant roots

Madhu Sudan Acharya, Sandra Patricia Alvarez Suarez, and Markus Rauchecker

Institute of Geotechnical Engineering; Department of Civil Engineering and Natural Hazards, University of Natural Resources and Life Sciences, Vienna, (masuaa@yahoo.com)

The stability of a slope depends on the strength of the soil material comprising of the slope, the triggering factors and slope geometry. Vegetation growing on the slope can have mechanical, biological and hydrological roles which influence the strength characteristics of the material on the slope.
The mechanical contributions arise from the physical interactions of either the foliage or the root system of the plant with the slope (Gray & Sotir, 1996). The plant roots increase the soil suction reducing pore water pressures, which significantly increases the cohesion (c) and also the friction angle (φ) to some extent. In an experimental investigation carried out in a highway embankment in Germany, an increase of effective cohesion from 1.1 kN/m^2 to 6.3 kN/m^2 and friction angle from 33.1° to 34.7° were observed. (Katzenbach & Werner, 2005).
Considering the complex nature of influences of plants on slope stability, more field oriented experimental research works on different vegetative systems are required to quantify the role of different plants in slope stability.
In the above context, in order to observe the increase in the shear strength of soil by different types of plant roots, an experiment has been carried out at the University of Natural Resources and Life Sciences (BOKU). This experiment consist of 10 wooden boxes of size 50x50x60 cm and 5 boxes of size 50x50x40 cm filled with normal soil suitable for growth of plants. The ten number of bigger size boxes are planted with acer campestre plants. In the other five boxes of smaller size, a mixed seed of 21 different grass species has been sowed. All the boxes are kept in an experimental field and regular take care is being done. The grass will be cut each year and the biomass will be measured. The undisturbed soil samples from each of these boxes in first and second year will be taken to the large frame (50x50cm) direct shear test equipment and tested for direct shear. A comparison of shear strength of soil with and without plant will be done after the end of second year. Similarly, a comparison between the role of tree roots and grasses on the increase in the shear strength of soil will also be made.