Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09439, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09439
EGU General Assembly 2008

Soil bioengineering techniques on heavily compacted soils: Experiences from a test site

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Geotechnical regulations usually recommend the highest practical soil compaction for levees to provide structural integrity and controlled rates of seepage. From a soil bioengineering point of view compacted soils impede rooting and plant growth. High soil bulk densities reduce development of roots, resulting in decreased absorption of water and nutrients. Consequently plant growth is limited, depending on soil condition and plant species.

Within the frame of a research project carried out by the Institute of Soil Bioengineering and Landscape Construction (University of Natural Resources and Applied Life Sciences, Vienna), focusing on woody plants on levees, research levees were planted with different soil bioengineering techniques. The soil material used for the levees consisted of a sand-silt composite. A standard compaction test of the material resulted in a maximum density [ρ_{pr}] of 2.028 g/cm^3 and optimum moisture content [w$_{pr}$] of 9.7 %. The research levees should comply with modern construction standards and reach a minimum degree of compaction of 97% Proctor [D$_{Pr}$], meaning a dry density [ρ_D] of 1.968 g/cm^3. Investigations with a gamma probe and soil sample rings at the research levees lead to dry densities [ρ_D] between 1.886 and 2.028 g/cm^3 and 93 and 100% Proctor [D$_{Pr}$], with an average value of 97%.

From May to June 2007 the levees were planted with the following soil bioengineering techniques: (1) dormant cuttings; (2) living brush mattresses (longitudinal); (3) living brush mattresses (transversal) and (4) jute netting mulch seeding. The dormant cut-

tings and living branches tested originated from the Purple-willow (*Salix purpurea* L.). A mixture of grass- and herb-seeds, suited to dry conditions was used for the jute netting mulch seeding. For better initial growth, under dry site conditions, an irrigation system was installed. Measured plant parameters were vitality, shoot lengths and shoot diameters, determining above ground biomass. Root growth is investigated in an extra plot area allowing excavation of the plants. Estimated rooting parameters are rooting depth, spatial pattern and below ground biomass.

The proposed contribution discusses the effects of high soil compactions on plants and describes design and construction of the soil bioengineering techniques at the test site. Methodology of research and initial results of the vegetation performance after one year of growth are presented.