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Root Development of Salix purpurea L. on Heavily Compacted Levee Soils

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The effect of woody vegetation on levee stability is discussed controversially. On the one hand woody plants improve slope stability, prevent erosion failures and may aid in levee stability. On the other hand it is believed that woody vegetation has negative impacts which are largely related to the rooting system. Hence, root penetration can facilitate water movement – seepage or piping – as well as living and decaying roots can lead to voids and threaten the structural integrity of levees.

In general root architecture is known for many plant species, but specific root characteristics and their interaction with soils are influenced by many factors, and therefore poorly understood. Consequently the current research investigates the rooting performance of woody vegetation by singling out a special type of vegetation which is often used within soil bioengineering techniques at river embankments. This vegetation type is a dense stand of shrubby willows (Salix purpurea L.), implemented with brush mattresses.

The data is collected from a test site constructed in 2007, 5 km northeast of Vienna, Austria. Part of the test site is a research levee built true to natural scale. The fill material of the levee is a mineral silt-sand-gravel compound classified as silty sand, which was compacted to a dry density of 1.86 g/cm^3. The planting of vegetation was applied directly to the compacted levee body using only a thin layer (2-4 cm) of humus topsoil. In 2009 the studies were supplemented with a lysimeter-like setup consisting of a total of 20 containers. The lysimeters were filled homogenously with the same soil as the levees and were consolidated to the same degree of compaction. They were planted similar to the research levees.

Within the investigations a comprehensive annual vegetation monitoring program was carried out. Measured aboveground parameters were shoot diameter, shoot length, biomass and leaf area index (LAI). Monitored rooting parameters – examined by excavation – were rooting depth and root mass, complemented with several further rooting parameters obtained from the lysimeters and analyzed by WinRhizo.

The proposed contribution will present the results of the vegetation monitoring program. Gained results will be discussed with reference to levee stability.