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The impact of dense willow stands (Salix purpurea L.) on the hydrology and soil stability of heavily compacted soils

Walter Lammeranner, Michael Obriejetan, and Florin Florineth

Institute of Soil Bioengineering and Landscape Construction, University of Natural Resources and Applied Life Sciences, Wien, Austria (walter.lammeranner@boku.ac.at)

Willows are often used in soil bioengineering techniques for stabilizing heavily compacted soils (e.g. embankments, landfills, levees etc.). Beyond reinforcing and anchoring effects by their root matrix, plants enhance soil stability by decreasing pore-water pressure due to evapotranspiration.
In the common praxis of soil bioengineering, it is taken for granted that willow stands have higher evapotranspiration rates than grass-herb (turf) vegetation. But the positive effect of dense willow stands on pore water pressure from the soil bioengineering point of view is insufficiently studied and therefore difficult to quantify. Hence, the study investigates the effect of willow stands on evapotranspiration and seepage compared to grass-herb vegetation using a lysimeter-like setup.

The weighable lysimeters are composed of two planted barrels (one with a dense willow stand grown from brush mattresses; one with turf vegetation) and one unplanted barrel. The fill material used is a mineral silt-sand-gravel classified as silty sand compacted to 97% Proctor [DPr], meaning a dry density [D] of 1.97 g/cm^3. Each barrel is equipped with two soil moisture sensors, four tensiometers and seepage measurement devices. Furthermore the relevant meteorological parameters as precipitation, air temperature, air moisture wind speed and radiation are measured. Plant parameters such as biomass, leaf area index and root growth are observed in 17 additional barrels.

The talk is going to deal with methodology and setup of the lysimeter investigations, showing the results of the first growing season of these two vegetation types compared to bare soil. As result of the first growing season, evapotranspiration rates of the willow stands were significantly higher than those found with grass-herb vegetation, whereas seepage was significantly lower.