



Long-term effects of deep soil loosening on root distribution and soil physical parameters in compacted lignite mine soils

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Soil compaction is a major problem of soils on dumped mining substrates in Lusatia, Germany. Deep ripping and cultivation of deep rooting plant species are considered to be effective ways of agricultural recultivation. Six years after experiment start, we studied the effect of initial deep soil loosening (i.e. down to 65 cm) on root systems of rye (*Secale cereale*) and alfalfa (*Medicago sativa*) and on soil physical parameters.

We conducted a soil monolith sampling for each treatment (deep loosened and unloosened) and for each plant species (in three replicates, respectively) to determine root diameter, length density and dry mass as well as soil bulk density. Further soil physical analysis comprised water retention, hydraulic conductivity and texture in three depths.

The results showed different reactions of the root systems of rye and alfalfa six years after deep ripping. In the loosened soil the root biomass of the rye was lower in depths of 20-40 cm and the root biomass of alfalfa was also decreased in depths of 20-50 cm together with a lower root diameter for both plant species. Moreover, total and fine root length density was higher for alfalfa and vice versa for rye. The soil physical parameters such as bulk density showed fewer differences, despite a higher bulk density in 30-40cm for the deep loosened rye plot which indicates a more pronounced plough pan.