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Impact of vegetation growth on properties of rain garden soil layer

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Rain gardens have recently become popular as a mean of stormwater management in urbanized areas. Rain garden uses a natural process of water filtration through soil and rhizosphere to clean and retain water. Among other benefits, rain gardens improve the living conditions of inhabitants via renewed contact with nature. Two experimental rain gardens have been recently established on premises of University Centre for Energy Efficient Buildings of Czech Technical University in Prague. The target of the experiment aims at assessment of time development of the properties of the soil layer. This includes regular soil sampling, determination of hydraulic properties, and monitoring of water contents and pressures in the filter layer of rain gardens. We present the outcomes of the first stage of the research that preceded building of rain gardens itself. To test the soil and plants intended for use in experimental rain gardens the two small pilot plots, 60 cm long and 80 cm wide were established in spring 2017. To build the pilot plot, the rectangular pit was dug to the depth of 40 cm and walls were lined with the metal sheet. The 30 cm thick soil layer was placed to the bottom of the pit. Filter layer consists of 50% sand, 30% compost and 20% of topsoil. The surface was mulched with 5 cm layer of gravel and planted by perennials specifically suitable for rain gardens. The first plot was planted with Molinia caerulea and Hemerocallis Lemon Bells, while the second plot was planted with Euphorbia amygdaloides and Aster novae – angliae Purple Dome. Pilot plots were irrigated weekly in order to achieve an equivalent rainfall amount that is 10 times higher than the amount of natural rainfall. This treatment represented the water regime of a common rain garden that usually collects rainfall from the roof area that is 10 times larger than the infiltration area of rain garden itself. Soil samples were taken from the pilot rain gardens after soil packing and then two months later. Infiltration experiments were conducted on samples using a concurrent bimodal x-ray and neutron imaging. Scanning electron microscope analysis was done on samples impregnated with resin to characterize the soil microstructure. The preliminary results will be presented at the conference.