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Bricks as indicators for an urban soil genesis

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Bricks can be considered as anthropogenic markers since they are regularly found in urban soils worldwide. They are among the most resistent residues of building materials, therefore are called technogenic substrates. They have been dumped to urban soils since more than 4000 years and can be dated back to their burning using thermoluminescence. In Berlin, bricks have been piled up to more than 37 rubble mountains in the city after WW II. The devils mountain, the most prominent of them is higher than 60m.

However, bricks are known not to be isolated in the soil but to fulfill soil functions due to their porosity. Therefore, they are nice research objects for soil scientists. The purpose of this study is to investigate abundance and functions of bricks in urban soils, focusing on plant nutrition and contamination aspects.

Three different Berlin urban soils have been studied for their brick contents in the coarse and fine earth fractions by endless hand sorting. Light and scanning electron microscopy was then employed to investigate the bricks for proofs of plant roots. Third, CEC, pH, EC, Corg, nutrient storage (XRF) and availability (2:1 extract, ion chromatography, AAS) of bricks and fine earth fractions of the corresponding soil horizons have been investigated.

The fine earth fractions of the investigated soils contain 3 to 5% of bricks, while the coarse fractions contain up to 50%. We found roots entering brick pores or at least attached to brick surfaces. Therefore, plants can use the water and nutrients stored in bricks.

The CEC of bricks is grain size dependent and reaches a maximum of 6 cmolc kg-1 for particles smaller than 0.063 mm. This dependency is not explained by a low pore connectivity. Rather, it is the result of the restricted diffusion into the brick pore system due to the short shaking time in the CEC analysis protocol. From the nutrient storage and availabilities we conclude that bricks can better supply plants with K, Mg, Ca and S than the bulk soil at the investigated sandy site. However, in general, the nutrient availability from bricks is rather low compared to agricultural soils, except for Ca and S.

Because of the water and nutrient storage, low contamination status and the possible rooting of bricks, they can be used for amelioration of poor sandy soils and for soil construction.