



## Black carbon in paved urban soils

T. Nehls (1), S. Brodowski (2)

(1) Dept. of Soil Protection, Institute of Ecology, Technical University of Berlin, Germany, (2)  
Dept. of Soil Science, Institute of Agronomy, University Bonn, Germany,  
(thomas.nehls@tu-berlin.de / Fax:+49-30-31423309)

The formerly light brown, sandy material which fills the spaces between single pavestones of new paved urban soils changes its color and properties due to incorporation of all kinds of urban dirt. The very dark color of that altered material is explained by depositions of black carbon (BC). It was the goal of the study to quantify the contents, the sink function and the ecological properties of BC in these highly anthropogenic soils. Paved urban soils of Paris, Berlin and Warsaw have been analysed for BC using benzene polycarboxylic acids as markers (Glaser et al., 1998, Brodowski et al., 2005)

The BC contents for the upper layer show an average of  $3.4 \text{ g kg}^{-1}$  ( $SE= 0.3 \text{ g kg}^{-1}$ ). The BC contents from the three cities are not significantly different, which is an effect of the great variety of values, especially a great heterogeneity among the cities. BC makes 17 % of the  $C_{org}$  in the upper layer. In the 1 to 5 cm layer, representing the construction material, the average BC content is significantly lower than in the upper layer ( $0.5 \text{ g kg}^{-1}$ ).

A rough approximation of the BC stored in paved urban roadside soils of Berlin demonstrates the importance of open soil surfaces inside urban areas: The first 5 cm of the paved soil can store the emissions of up to 40 years. An approximation of the total BC stored in paved soils on the global scale demonstrates the importance of urban soils for global carbon balances: Although only 15 % of the global urban area has been considered as traffic area and only 30 % of this area has been considered to be open soil surface and only the first 5 cm has been considered to contain BC, 50 % of the annual BC emissions caused by fossil fuel burning can be stored in that compartment. The heavy metal retardation properties of BC has been studied by the heavy metal adsorption isotherms. A correlation between the BC content and the Freundlich K for Pb has been found. This finding has been confirmed in a laboratory experiment using charcoal. Therefore, urban soil organic matter might be build up to an important amount from BC which can fulfill positive ecological functions.