4. Soil characteristics of gravel walks in urban areas and their relationship to adjacent soils

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Abstract:
Gravel walks are the common footpath in parks, church yards, along streets in suburbs. Gravel layers are also found on car parks. The gravel layer is a sink for dust. It can be also a source for materials which affects the adjacent soils. Dust from gravel walks has relevance for health of visitors, and particular of children in prams which are near the ground. Gravel walks will develop with time to soils and should be designated as soils.

Walks from 3 park areas, one burial ground and one connection path, and one car park were investigated in the Ruhr Area, Germany. Samples were taken in the centre and in 1 meter distance beside the walks from the lawn. At each site the samples were taken underneath a tree and without tree cover. Sampling depths were 0-0.2, 0.2-1, 1-2 and 2-5 cm. As far as it was possible the samples were taken as volume samples.

The gravel content of the walks was between 20 and 70%. It increased with depth. The carbonate contents of the fine earth were high to very high. They increased with depth. The soil of the lawns showed a liming effect. The carbonate content was low and decreased with depth. The walks were slightly alkaline to high alkaline up to pH 8.7 in 0.01 mol CaCl2 - suspension. It increased with depth. The pH of lawns was neutral to slightly alkaline. The C content from organic matter and inorganic C such as from soot, coal etc, varies from low to very high. In part it increases wit depth, in part it decreases. The C/N ratios of the top layers are similar of the adjacent soils. This indicates that organic matter has accumulated in the surface layers of the walk ways. The organic matter content of the lawn soil was very high and decreased with depth. The heavy metal contents varied extremely between the individual parks. The heavy metal content of the lawn soils was in the old park much higher than in the younger ones. Extreme high it was in the car park soil. Extreme Cd contents of walks were 35, of lawns 9 and car park 30 mg/kg. Maximum Pb contents found in walk soils were 2000, in lawn soils 540 and in car park soils 2250 mg/kg. Very strong Zn content increases were found with depth. Cu and Cr contents are only in few walks increased. Investigations of plant available phosphorous and potassium show the high contents of lawns and low ones of walk soils. The main faction of fine earth of the walks is sand followed by silt. The clay content is very low. The lawn soils have higher clay content. The largest fine earth fraction is also sand. The results from sites with and without tree did not show distinct differences.

The results show that accumulation of organic matter and leaching of carbonates occurs in the walk soils. Therefore they have characteristics of Regosols. The organic matter is from trees or imported from the adjacent lawns. The question is if this soil can be designated as Regosol or member of a new soil type like Particle Intrusols. Due to the high carbonate content the soils would be Calcaric Regosols.

The result shows that there is a strong movement and exchange of compounds between walk and lawn soil. The strong difference in the composition of walk and lawn soils makes this visible. From this result we must assume that between other plots in the city happens the same.

The heavy metal content varies. It can be very high. Therefore it is necessary to prove it and assess its effect on health. Silt and sand content will create dust from walking and prams driving. The dust risk must be proved too.

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