Phosphorus status in intensively used soils in Krakow

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Many elements can be introduced in the soil as a result of human activity, including mainly: carbon, nitrogen, phosphorus, sodium, calcium and heavy metals. Among them, phosphorus is a particularly sensitive and persistent indicator of the former human settlement and activities. In the soil environment soluble phosphates are rapidly moving in insoluble forms through the chemical adsorption. In acid soils insoluble aluminum and iron phosphates are formed, and in alkaline soils calcium and magnesium phosphates. Soils of urban areas, because of strong human impact, are usually characterized by a large enrichment in phosphorus compounds (Zhang et al. 2001, Gąsiorek 2007). Soils of Krakow, a city with more than a thousand years of history - located in the south-eastern Poland, were also exposed to strong anthropopressure. Convent gardens are these places in Krakow, where in the soils, as a result of the impact of the urban environment and horticultural use, occurred accumulation of anthropogenic phosphorus.

On the area of convent gardens in Krakow were performed soil profiles, from which all horizons and anthropogenic layers soil material was taken for further analyses. These soils according to WRB (2006) were classified to Hortic Anthrosol. They were characterized by deep humic horizon, high content of humus and neutral reaction. Phosphorus content extracted in 0.5 $mol \cdot dm^{-3}$ $NaHCO_3$ (Olsen method), especially in the humus horizons was higher than 100 mg $P_2O_5 \cdot kg^{-1}$. Thus, it was met the criterion of phosphorus content to distinguish in them *hortic* horizon. Research of Zhang et al. (2001) indicate that urban soils with high phosphorus content can contribute to water eutrophication. There was significant correlation between the amount of phosphorus in ground water and the content of phosphorus in the soil determined by Olsen method. In order to verify the possibility of transfer of phosphorus from convent garden soils in Krakow to soil solution an experiment with the use of vacuum soil water samplers was established in spring 2010.

Zhang G-L., Burghardt W., Lu Y., Gong Z-T. 2001. Phosphorus-enriched soils of urban and suburban Nanjing and their effect on groundwater phosphorus. J. Plant Nutr. Soil Sci. 164 (3): 295-301.

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