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# Biogeochemical features of maple and dandelion in Eastern Administrative District of Moscow

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Today more than half of world population and 73% of population in Russia live in cities. Moscow is the only one megacity in Russia with the population more than 11 million. The main source of technogenic impact in Moscow is transport. Plants can be used as indicators of urban environment heavy metals and metalloids (HM) pollution. Large scale biogeochemical research was done in Eastern Administrative District of Moscow. Apart from transport there are many industrial sources of pollution: metalworking, mechanical engineering, chemical, energetic and incinerator. This study focuses on detection of HM composition of woody plant leaves (maple – Acer platanoides) and herbaceous species leaves (dandelion – Taraxacum officinale). Plant material was collected on a regular greed with a step of 500-700 m. Background plants were sampled at 40 km west away from the city. Determination of Fe, Mn, Mo, Cd, Pb, Zn, Cu, As, Sb in plants was done using atomic absorption spectrometry after washing, drying and digestion with $HNO_3$+$H_2O_2$.

It was revealed that dandelion accumulates (index – concentration factors CF relatively background) Mo13Fe6Pb5Cd4.5As4Sb3, while maple Sb13As5.5Fe3Mo2Pb,Zn1.5. Geochemical specialization of plants in functional zones (industrial, transport, recreational, agricultural, residential areas with high-, middle- and low-rise buildings) was identified. The highest CF were determined for Mo in dandelion of all zones except industrial. In which the most accumulated elements are Fe and Mo, as well as Pb10As6Sb5Cu2. Arsenic is accumulated by dandelion in all zones. Copper is not concentrated by herbaceous species because of antagonism between Mo and Cu. The highest CF were determined for HM in maple of industrial zone. There trees concentrate Sb and As9Fe7Mo6Pb3Zn2. In the other zones levels of CF are lower in 2-5 times. Dandelion and maple don't accumulate Mn because of antagonism between Zn, Mo and Mn.

Urban plants condition is estimated by the ratio between toxic (Cd, As, Sb, Pb) and essential (Cu, Fe, Mn, Mo, Zn) elements. For evaluation of intensity of photosynthesis and plants growth can be used Fe/Mn, Zn/Mn, Cu/Mn and Mo/Mn ratios. In dandelion and maple Fe/Mn is 6.6 and 3.3 times higher than in background vegetation, Pb/Mn – 5.5 and 2.5 times, (Cd+As+Sb+Pb)/(Cu+Fe+Mn+Mo+Zn) – 2.9 and 1.6 times respectively. In industrial, transport zones and residential area with high-rise buildings the largest increase of those ratios were discovered. Differences in geochemical specialization were shown by Sb/Mo ratio: in dandelion it is 5 times lower than in background plants, while in maple it is 4.5 times higher. The same situation was defined for As/Mo.

Strong positive linear relationship between Sb deposition rates and Sb concentrations in maple was calculated (r=0.86). Furthermore moderate positive linear relationships between Cd concentrations in soils and dandelion (r=0.69), concentrations of mobile forms of Pb and Sb in soils and maple (r=0.67 and 0.66), Fe deposition rates and concentrations of this element in maple (r=0.51) were revealed.