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The selenium content and dehydrogenases activity in selected organic, mineral-organic and alluvial soils of Pomorze and Kujawy region (Poland)

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In a global context, selenium (Se) is a very important trace element. The boundaries between animal toxicity and deficiency of Se are relatively narrow, and both phenomena are common around the globe. In soil, the processes of decomposition and synthesis of mineral and organic matter occur all the time, and are monitored and activated by a variety of enzymes.All these processes form soil metabolism, which is crucial for soil fertility maintenance and preservation. The purpose of the study was to gather more information about possible relationship between selenium and dehydrogenases activity in selected organic, mineral-organic and alluvial soils from Pomorze and Kujawy region. Soil samples were taken from surface and subsurface layers. Total selenium content was determined fluorometrically as described by Watkinson. Forms of selenium available to plants were extracted with DTPA and then determined fluorometrically. Dehydrogenases activity was assayed colorimetrically using TTC as a substrate. Total selenium content in organic and mineral-organic soils (Histosols) of Pomorze and Kujawy region was in the range of 0.143-0.846 mg kg-1, and in alluvial soils (Fluvisols) 0.202-0.424 mg kg-1, whereas the content of Se-DTPA was 0.0049-0.0075 mg kg-1 and 0.0046-0.0069 mg kg-1, respectively. In general, the highest amounts of selenium content were obtained in soil samples taken from the upper layer of investigated soils. In Histosols with high organic carbon content amount of DTPA-extractable forms of selenium in the total selenium content varied from 0.8-1.2%, and in Fluvisols was 1.5-2.6%. Dehydrogenases acitivity in Histosols ranged from 188.8 to 2851.5 microgramm TPF kg-1 24h-1 (mean value was 1729.6 microgramm TPF kg-1 24h-1). In Fluvisols mean value of dehydrogenases activity was 550.1 microgramm TPF kg-1 24h-1. Total selenium and Se-DTPA content in the soils

was statistically highly correlated with pH and organic carbon content. We found a very significant correlation between total selenium and dehydrogenases activity in the investigated Histosols and Fluvisols.