

Content of assimilable microelements in topsoil and their dependence on physicochemical properties

Zawartość przyswajalnych mikroelementów w warstwie ornej gleby w zależności od jej właściwości fizykochemicznych

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In the years 2008–2011 in the Lubelskie voivodship (south-eastern Poland) an environmental studies were conducted. The main goal of these studies was to evaluate the actual pH and supply of basic macro- (P phosphorus, K potassium, Mg magnesium and S-SO₄ sulphur in sulphates) and microelements, such as boron (B), copper (Cu), iron (Fe), manganese (Mn) and zinc (Zn) in soils. Additionally, relationship between the content of measured microelements and soil agronomic class, humus content and pH of investigated soils was determined. All of the performed chemical analysis were conducted in accredited lab of Regional Agrochemical Station in Lublin. To carry out research on content of macroelements chemical analyzes of 32741 soil samples were performed and microelements were assayed in 2194 samples. Samples were collected using Egner sticks. Mass of the sample taken from the 0–20 cm layer was approximately 500 g. Assessment of humus content, pH_{KCl} and supply of assimilable forms of phosphorus, potassium, magnesium and sulphate sulfur indicates that they were positively correlated with the amount of colloidal clay and particles < 0.02 mm. Generally, positive correlation between the content of assimilable forms of phosphorus, potassium, magnesium and sulphur and content of humus was observed in the topsoil. A highly pronounced and usually significant dependence between assayed forms of macroelements (P, K, Mg i S-SO₄) and pH class was found. The lowest content of assimilable forms of nutrients was observed in highly acidic and acidic soils, highest – in neutral and alkaline soils. Of all of assayed assimilable forms of microelements (B, Cu, Fe, Mn, Zn) positive and significant correlation was found between soil agronomic class and content of manganese, iron and zinc. However, there were no statistically proven impact of assayed soil agronomic class on the content of boron and copper observed. The content of humus in the soil affected noticeably and positively the content of soluble forms of zinc, iron and manganese and less apparently copper and boron content. A significant and positive correlation between soil pH and content of soluble forms of Mn, Fe and B was found; such an effect was not observed with Cu and Zn content. Statistical analysis indicated that among assayed microelements content of boron and manganese depended to the greatest extent on investigated physicochemical properties. However, it should be noted that measured physicochemical properties in less than 50% determined content of evaluated microelements in soil. Information about current pH and content of basic macro- (P, K, Mg, S-SO₄) and microelements (B, Cu, Fe, Mn, Zn) in soils and their relationship to physico-chemical properties are relevant for farmers, as those informations can be used as a basis for making rational management related to calcium, calcium-magnesium, mineral, natural and organic fertilization and soil liming, as well as enable and facilitate agricultural services such activities in the area covered by the study.