

New threshold values for the assessment of micronutrient status in soils for winter wheat production

Liczby graniczne do oceny zawartości mikroelementów
w glebie w uprawie pszenicy ozimej

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The aim of this study was to test the usefulness of Mehlich 3 method to assess the concentrations of B, Cu, Fe, Mn and Zn in the soil and develop threshold values for the needs of fertilization advisory services in the cultivation of winter wheat. The first stage of the study was to test whether Mehlich 3 method is better than the method using 1 M HCl solution, which is currently used in Poland. The comparison of those two methods for extracting forms of soil micronutrients available for wheat was performed based on results obtained from a collection of 330 soil and plant samples. The assessment was made based on the correlation coefficients between: (a) the concentration of a given microelement in a plant and its concentration in the soil, and (b) bioaccumulation factor of a microelement and soil features. It has been assumed that a more useful method is the one for which higher correlation coefficients are obtained. The analysis of the correlation coefficients showed that 1 M HCl solution was more useful for extracting phytoavailable forms of micronutrients from the soil than Mehlich 3. In this situation, it was decided to calculate new, more precise threshold values for 1 M HCl method, which has so far been used in Regional Chemical-Agricultural Stations (OSChR). Threshold values were calculated using regression equations which described the relationship between microelement concentration in the soil and a plant.

New threshold values were developed for winter wheat. They represent a lower limit of the range of microelement concentration in the soil, which is sufficient for the growth and development of this plant. If the concentration is lower than the threshold value, it means that it is not sufficient, and that wheat fertilization is recommended. It is highly probable that when a given microelement occurs in the soil above its threshold concentration, the application will not bring any economic benefits to the farmer.