

Spatial differentiation and spatial variability of the concentration of microelements in winter wheat in field production conditions

Zróźnicowanie przestrzenne i zmienność zawartości mikroelementów w pszenicy ozimej w warunkach pola produkcyjnego

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The present study aimed to characterize the spatial differentiation and spatial variability of the content of microelements in winter wheat.

An assessment of the variability can be used to describe the opportunities for applying variable doses of the analysed elements according to content of the elements in plants.

The variability of the content of Cu, Mn, Fe and Zn in winter wheat was evaluated in field experiments in Ptakowice (N: 50°45' E: 17°32') in the Opole voivodeship. The Mulan variety of winter wheat was sown in soil agronomically classified as average with neutral pH and an average level of absorbable forms of phosphorus, potassium, and magnesium. The content of the studied microelements in winter wheat was measured by taking 137 plant samples from a 22 hectare area of a production field during the two developmental phases of shooting (BBCH 39) and flowering (BBCH 55).

The calculation of the variability of the content of the microelements in the soil was done with classic descriptive statistics and spatial statistics. The analysis of the spatial autocorrelation in the spatial statistics was performed using Moran's I index and the assessment of spatial variability was calculated with a semi-variance estimator.

The average content of all the designated microelements in the samples of wheat taken in the earliest stage of vegetation (BBCH 39) were greater than the content in the flowering stage. The lowest coefficient of variability at both times the sample plant materials were taken was the content of iron in the wheat.

Semi-variogram analysis showed that there was a slight increase in the diversity of samples that had been located near each other between the study periods. This effect was the least visible for manganese. The second research method, using Moran's I coefficient, showed a slight shift of values towards zero, i.e. towards the lack of a spatial autocorrelation. The conclusion from both test methods is that values for the spatial dependence of adjacent test samples was low in the first phase (BBCH 39) of research and was slightly weaker in the second phase (BBCH 55).