

Assessment of the content of selected microelements in grains of spelt fertilized with nitrogen, copper and manganese

Ocena zawartości wybranych mikroelementów w ziarnie orkiszu nawożonego azotem miedzią i manganem

Tomasz Knapowski¹, Ewa Spychaj-Fabisiak¹, Wojciech Kozera¹, Bożena Barczak¹, Barbara Murawska¹, Dorota Wichrowska², Edward Majcherczak¹

¹Department of Agricultural Chemistry, ²Department of Food Technology, Faculty of Agriculture and Biotechnology, University of Science and Technology in Bydgoszcz, Poland
e-mail: knap@utp.edu.pl

Results of research in nutrition sciences dynamically developing for years, combined with the analysis of relationships between a diet and human health, suggest reappraisal of old plant species. Spelt wheat is one of them. Primary features of grain of *Triticum aestivum* ssp. *spelta* L., being a rich source of valuable nutrients, are searched for modern consumers, as an attractive element of a healthy diet. Spelt wheat is characterized by not only a higher content of nutrient, but also by smaller site requirements and lower expenditure for means of production, as compared with common wheat. Demand for the grain of this cereal forces conducting multidimensional research over the factors affecting its qualitative characters. All the more so as the high quality of produce made of spelt wheat is guaranteed by the use of only suitable material for production. Obtaining definite values of individual parameters is determined by ability to select the cultivation technology suitable for the given soil and climate conditions and the management level and the particular cultivar. Among the presented problems of spelt wheat cultivation, there is no explicit information on its response to cultivation practices, including fertilization. In spite of small demanding of this cereal in respect of fertilization with nitrogen, but quite high susceptibility to the deficiency of this element, data describing the response of spelt wheat grown in conditions of Poland to fertilization with this element is regarded as insufficient. Moreover, growing attention is focused also to favourable effect of fertilizing cereals with microelements, especially at nitrogen fertilization. For application of microelements in spelt wheat cultivation, there is no definite data on the usefulness of their use and conditions the application is performed. Therefore, determination of appropriate requirements concerning fertilization not only will verify recommendations for the dose levels of individual nutrients, but may also indicate their interactions.

The aim of this study was to estimate the effect of different fertilization with nitrogen and foliar application with microelements and their interaction on the content of Cu, Mn and Zn in spelt wheat grain. The conducted study was based on the two-factorial field experiment carried out at the RZD UT-P in Minikowo (53°10'2"N, 17°44'22"E, Kuyavian-Pomeranian province), established with the randomized split-plot design. Material used in this experiment was grain of *Triticum aestivum* ssp. *spelta* L. grown in conditions of different fertilization with nitrogen (1st factor, n = 3: 0, 25, 50 kg·ha⁻¹) and foliar application of microelements (2nd factor, n = 4: 0, Mn, Cu, Mn+Cu) and permanent phosphorus and potassium fertilization. Three-year experiment (2009–2011) was conducted in soil of the very good rye complex. Nitrogen fertilization was applied as 34% ammonium nitrate, and foliar application of manganese and copper as fertilizers Adob Mn (1.5 l·ha⁻¹) and Adob Cu (1.0 l·ha⁻¹).

Based on the obtained results we found that nitrogen fertilization, foliar application of microelements and interaction of the above factors significantly determined the contents of copper, manganese and zinc in the grain. The highest amounts of Cu and Mn were obtained after the application of 50 kg N·ha⁻¹, and each increase in nitrogen fertilization caused a decrease in the content of zinc in the studied grain. Foliar application of copper, manganese and combined application of copper and manganese resulted in significant changed in concentrations of Cu, Mn and Zn in the analysed plant material as compared with the treatment without fertilization with microelements.