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ORIGINAL PAPER

Potassium and magnesium deficiency in soil: the effect of mineral supplementation on organically grown winter spelt*

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Abstract

The aim of this study was to evaluate the effectiveness of supplementary K and Mg mineral fertilization on winter spelt yield and grain quality. Two 4-year field experiments investigating the effects of mineral fertilization on winter spelt (*Triticum spelta* L.) were conducted on Zgniłobłoty and Budziszewo organic farms with a long history of organic management. The first experiment was established on medium-heavy soil, and the second experiment – on heavy soil. Patentkali fertilizer was applied at 66.4 kg K ha^{-1} and 16.1 kg Mg ha^{-1}, and sulfate of potash (Kalisop) was applied at 66.4 kg K ha^{-1}. Since both fertilizers contain sulfur (S), supplemental S was supplied at 45 kg ha^{-1} (Patentkali) and 23.9 kg ha^{-1} (Kalisop). Winter spelt cv. Schwabenkorn was grown on medium-heavy soil. Soil pH was slightly acidic; content of available K was very low, and the content of available P, Mg, and S was moderate. Wheat spelt cv. Oberkulmer Rothkorn was grown on heavy soil. Soil pH was neutral; P content was low; K content was very low; Mg content was very high, and S content was moderate. The preceding crops were red clover in Zgniłobłoty (medium-heavy soil) and ley in Budziszewo (heavy soil). In the first experiment, the average spelt yield was 5.94 ha^{-1} of hulled grain and 4.27 t ha^{-1} of dehulled grain. Dehulled grain yields increased by 16.6% in response to mineral fertilization with K and Mg, and by 10.2% in response to K fertilization. Fertilized spelt produced larger grains with higher protein content. In the second experiment, the average spelt yield was also relatively high, at 5.76 and 4.20 t ha^{-1} of hulled and dehulled grain, respectively. Spelt yields tended to be higher when mineral fertilizers were applied to heavy soil. Protein content and concentrations of P, K, Mg and Ca in grain did not differ significantly between treatments fertilized with K+Mg and the unfertilized control treatment.

Keywords: winter spelt, organic farming, potassium, magnesium, soil deficiency, mineral supplementation

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