

Effects of the phosphogypsum and brown coal application on Cu and Zn uptake and concentration in maize

Oddziaływanie fosfogipsu oraz węgla brunatnego na zawartość oraz pobranie miedzi i cynku przez kukurydzę

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The pot experiment was carried out in the fully controlled conditions of growth cabinet on Haplic Luvisol with the soil texture classified as silty clay loam. The soil was characterized by acidic pH and low phosphorus and potassium contents. In the course of the experiment the effects of phosphogypsum and brown coal application on the crop yield and chemical properties were studied in KB2704 maize variety. Phosphogypsum was applied in five different doses (0, 6.25, 12.5, 36 and 50 g·kg⁻¹ soil), with this being combined with 0 and 50 g·kg⁻¹ soil of brown coal. Prior to sowing the soil was fertilized with potassium, magnesium and calcium nitrates. The plant material was collected three times (every 2–3 weeks) throughout the experiment.

The phosphogypsum supplementation, regardless of the dose applied, resulted in statistically significant enhancement of the dry mass accumulation in plant material collected in the second term. In contrast, the brown coal application increased dry mass exclusively in the last material collection.

The leaf copper content (3.33–8.61 mg·kg⁻¹ D.M.) varied mostly during the initial growth stages, with the highest Cu levels being found in the plants supplemented with 50 g·kg⁻¹ soil phosphogypsum and no brown coal additive. The copper accumulated in crop yield elevated significantly with increasing phosphogypsum doses; however, this was independent on the brown coal application.

The zinc concentrations determined in the plants studied were not affected by any of the experimental factors. The zinc accumulation – independent on both phosphogypsum and brown coal level during the initial growth stages – elevated significantly with the progress of development in the plants supplemented with 6.25, and 12.5 g·kg⁻¹ soil of phosphogypsum and simultaneous brown coal application.