

Utjecaj kalcizacije i gnojidbe fosforom na koncentraciju Zn i Cd u listu i zrnu pšenice

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Sažetak

Cilj je ovog rada utvrditi utjecaj kalcizacije i mineralne gnojidbe fosforom na ukupni (ekstrahiran zlatotopkom) i raspoloživi (ekstrahiran s EDTA) Zn i Cd u tlu, te koncentracije Zn i Cd u listu i zrnu pšenice.

Poljski pokusi postavljeni su 2003. godine na dva različita tipa tla, distričnom luvisolu i karbonatnom regosolu. Kalcizacija distričnog luvisola provedena je u tri razine: bez kalcizacije, 10, te 20 t ha⁻¹ karbokalka. Mineralna gnojidba provedena je svake godine u tri razine: bez gnojidbe, standardna (140-200:150:300) i dvostruka gnojidba fosforom (140-200:300:300) za usjeve u plodoredu: kupus, kukuruz, pšenica. Ukupno je analizirano 108 uzorka tla, 36 prije provođenja kalcizacije (proljeće 2003.) i 36 prije gnojidbe za pšenicu (2004.), te 36 nakon žetve pšenice (2005.). ICP-OES-om je nakon mikrovalne digestije utvrđena koncentracija Zn i Cd u 72 uzoraka pšenice prikupljenih tijekom vegetacije (36 list) i nakon žetve (36 zrno).

Koncentracije ukupnog Zn i Cd veće su u karbonatnom regosolu nego u luvisolu, a raspoloživog Cd i Zn veće su u kiselijem tlu. Analizom tla nije utvrđen značajan utjecaj kalcizacije i gnojidbe na koncentracije ukupnih Zn i Cd, a jedino je utvrđeno značajno povećanje Cd ekstrahiranog s EDTA kao posljedica provedene gnojidbe.

Viša koncentracija Cd i Zn utvrđena je u zrnu (Zn 66,514 mg kg⁻¹, Cd 0,104 mg kg⁻¹) nego u listu (Zn 23,735 mg kg⁻¹, Cd 0,068 mg kg⁻¹) pšenice, ali su odnosi Zn i Cd u zrnu i listu vrlo slični (349,98 i 346,56). Mineralna gnojidba i kalcizacija nisu znatno utjecale na koncentraciju Zn u listu pšenice, ali je mineralna gnojidba značajno smanjila koncentraciju Zn u zrnu pšenice. Nasuprot tome, povećana gnojidba fosforom rezultirala je povećanjem koncentracije Cd u zrnu, dok je kalcizacija značajno utjecala na njegovo smanjenje. Sve utvrđene koncentracije Zn i Cd bile su u dopuštenim koncentracijama, odnosno ispod koncentracija propisanih Pravilnikom.

Ključne riječi: pšenica, kalcizacija, trostruki superfosfat, Zn, Cd

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Liming and phosphorus fertilization impact on Zn and Cd concentration in wheat leaf and grain

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Abstract

The aim of this paper was to determine liming and phosphorus fertilization impact on total (extracted by aqua regia) and plant available (extracted by EDTA) soil Zn and Cd, and on Zn and Cd concentration in wheat leaves and grain.

The field trials started in 2003 on two soil types, dystric luvisol and calcareous regosol. Liming of dystric luvisol was conducted in three levels: control without liming, 10 t ha⁻¹ of carbocalk, and 20 t ha⁻¹. Mineral fertilization was conducted in every season in three levels: control without fertilization, standard (140-200:150:300) and phosphorus doubled (140-200:300:300) fertilization for crops in rotation: cabbage, corn, wheat. The 108 soil samples were analysed, 36 before liming (spring 2003) 36 before wheat sowing (2004) and 36 after wheat harvesting (2005). The 72 wheat samples were collected during vegetation (36 leaves) and after harvesting (36 grains), digested by microwave and Zn and Cd concentration measured by ICP-OES.

The total soil Zn and Cd concentrations were higher in regosol than in luvisol, but available Zn and Cd concentrations were higher in more acid soil. Soil analyses didn't show significant impact of liming or fertilization on total Zn and Cd concentrations, but only significant increasing of Cd extracted by EDTA as a result of fertilization.

Higher concentrations of Cd and Zn was found in wheat grain (Zn 66,514 mg kg⁻¹, Cd 0,104 mg kg⁻¹) than in wheat leaves (Zn 23,735 mg kg⁻¹, Cd 0,068 mg kg⁻¹), but relations Zn and Cd in the grain and the leaves was very similar (349.98 and 346.56). Mineral fertilization and liming did not significantly affect the concentration of Zn in wheat leaves, but the mineral fertilization significantly reduced the concentration of Zn in wheat grain. Contrary, increased phosphorus fertilization resulted by the increasing of Cd concentration in grain, while liming significantly impact on Cd decreasing. All identified concentrations of Zn and Cd were within the allowed concentrations defined by Croatian legislation.

Key words: wheat, liming, triple phosphate, Zn, Cd

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