

## Mineralnom gnojdbom obogaćena pšenica kao kvalitetnija hrana

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### Sažetak

Cink (Zn) je mikroelement esencijalan za ljude, životinje i više biljke, dok selen (Se) nije neophodan za više biljke. Pošto koncentracija Zn i Se u tlu utječe na koncentracije u biljkama, cilj je ovog istraživanja utvrditi utjecaj gnojidbe Zn i Se na njihovu koncentraciju u zrnu ozime pšenice. Poljski pokus s tri sorte pšenice (Srpanjka i Simonida kao visokoprinosne, te sorta Divana visoke kvalitete) proveden je u Banovcima sa 7 gnojdbenih tretmana: 1. kontrola, 2. Se folijarno, 3. dvostruki Se folijarno, 4. dvostruki Se na površinu tla, 5. Zn-sulfat folijarno, 6. Zn-EDTA folijarno, 7. Zn-sulfat folijarno + dopunska N gnojidba. Nije utvrđen značajan utjecaj gnojdbenih tretmana na prinos pšenice, ali su Srpanjka i Simonida imali veći prinos (prosječno 8,6 i 8,3 t/ha) od Divane (5,4 t/ha). Značajno najniža koncentracija Zn utvrđena je u zrnu Simonide (21 mg/kg), veća u zrnu Srpanjke (24), a najveća u zrnu Divane (35), ali nije utvrđena takva razlika sorti u koncentraciji Se u zrnu (171-180 µg/kg). Istovremeno, koncentracija je Cd bila značajno niža u zrnu Divane (39 µg/kg) nego Srpanjke (50) i Simonide (53), a sve su koncentracije Cd bile vrlo niske, na razini svega 20-26% maksimalno dopuštenih koncentracija u zrnu pšenice (200 µg/kg). Sve su gnojidbe cinkom rezultirale većim koncentracijama Zn nego na kontrolnom tretmanu (20 mg/kg), ali je učinak sulfatnog oblika Zn bio značajno veći (prosječno 40 mg/kg) nego učinak EDTA oblika (27 mg/kg). S druge strane, EDTA oblik rezultirao je 3,5 puta manjim koncentracijama Cd u zrnu u odnosu na kontrolni tretman, a nije utvrđen nikakav utjecaj sulfatnog oblika Zn na koncentraciju Cd. Oba načina aplikacije Se, folijarno i na površinu tla, rezultirali su povećanjem koncentracije Se u zrnu pšenice do 7,8 puta (od 52 do 410 µg/kg u prosjeku), s većim učinkom dvostruke nego jednostruke doze Se. Sorte pšenice značajno su se razlikovale u koncentraciji Zn i Cd.

**Ključne riječi:** biofortifikacija, cink, selen, kadmij, ozima pšenica

## Mineral improved wheat production for healthy food

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### Summary

Zinc (Zn) is a trace mineral essential for human, animal and higher plants, but selenium (Se) is not essential for higher plants. Concentration of Zn and Se in soil effect on concentration in plants, and therefore this study was aimed to determine the effect of Zn and Se fertilizer application on their concentration in the wheat grain. The field experiment was conducted on Banovci site with 3 cultivars of winter wheat (Srpanjka and Simonida - high-yielding, and Divana - high-quality) with following 7 fertilization treatments: 1. control, 2. Se foliar, 3. double Se foliar, 4. double Se on the soil surface, 5. Zn sulfate foliar, 6. Zn EDTA foliar, 7. Zn sulfate foliar + additional N. There was no significant effect of any fertilization treatment on grain yield, but Srpanjka and Simonida produced higher yield (8,6 and 8,3 t/ha in average) than Divana (5,4 t/ha). Simonida contained significantly lowest Zn (21 mg/kg), higher was in Srpanjka grain (24), and the highest in Divana (35), but no such cultivar effect was seen on Se concentrations in grain (171-180 µg/kg). At the same time, Cd concentration was significantly lower in Divana cultivar (39 µg/kg) than in grain of Srpanjka (50) and Simonida (53). Nevertheless, all the Cd concentrations were very low, at 20-26% of allowed maximum level in wheat grain (200 µg/kg). All the foliar applications of Zn resulted in higher Zn concentrations in wheat grain than on control treatment (20 mg/kg), but the effect of sulfate was much higher (40 mg/kg in average) than effect of EDTA form (27 mg/kg). On the other hand, EDTA form resulted in 3,5-fold decreasing of Cd concentration comparing to control, and there was no such effect of sulfate form. Both type of Se application, foliar and on the soil surface, increased Se concentrations in wheat grain up to 7,8 times (from 52 to 410 µg/kg in average), with higher effect of doubled than single Se application. The cultivars differ significantly in Zn and Cd concentrations.

**Key words:** biofortification, zinc, selenium, cadmium, winter wheat