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Iljkić, D.

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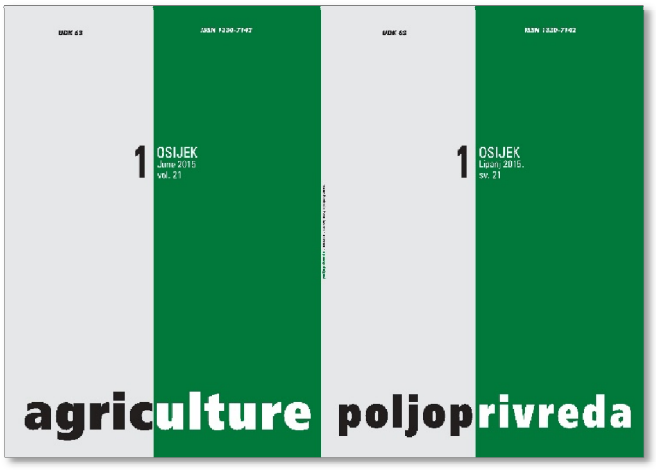

Poljoprivredni fakultet u Osijeku, Poljoprivredni institut Osijek

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GENOTIPSKI I AGROEKOLOŠKI UTJECAJI NA KONCENTRACIJE MIKROELEMENATA I PRINOS KUKURUZA

Dario Iljkić, dipl. ing. polj. *(1)*

Disertacija *(2)*

Usvajanje mineralnih elemenata i njihova translokacija i akumulacija u biljci ovisi o genotipu i ekološkim činiteljima. Stoga je cilj istraživanja bio utvrditi genetsku specifičnost hibrida kukuruza u pogledu koncentracije Fe, Mn, Zn i Cu u kukuruzu te utvrditi utjecaj agroekoloških uvjeta na koncentracije navedenih mikroelemenata u listu i zrnu, kao i na prinos zrna kukuruza. Istraživanja su provedena poljskim pokusima, u kojima je uzgajano deset hibrida kukuruza različitih FAO skupina (DRAVA 404, OS 430, OSSK 444, OS 499, OSSK 515, OS 5717, OSSK 552, OSSK 596, OSSK 602 i OSSK 617) tijekom dvije godine na dvije lokacije u Osječko-baranjskoj županiji. Lokacije pokusa, Osijek i Podgorač, međusobno su se razlikovale u svojstvima tla. Tlo u Osijeku pripada tipu eutrično smeđega tla, slabo kisele do neutralne reakcije, a u Podgoraču je tip tla pseudoglej na zaravni kisele reakcije. Dvije analizirane godine međusobno su se jako razlikovale prema klimatološkim elementima, naročito u pogledu količine oborina, te je 2010. godina bila izrazito vlažna, dok je 2011. bila manje povoljna za uzgoj kukuruza, s izraženim sušnim razdobljem i višom prosječnom temperaturom zraka. Prosječno ostvaren prinos zrna kukuruza u istraživanju iznosio je 8,61 t ha^{-1}. Kombiniranom analizom varijance utvrđeni su statistički opravdani učinci svih pojedinačnih čimbenika (hibrida, lokacije i godine), kao i svih interakcija na prinos zrna, pri čemu je osobito došla do izražaja lokacija, odnosno interakcija lokacija x godina. U Osijeku je postignut veći prosječni prinos zrna nego u Podgoraču. Na koncentracije većine mikroelemenata u listu i zrnu značajno ($P \leq 0,05$) su utjecali svi glavni čimbenici te su istraživani hibridi pokazali određenu genetsku varijabilnost glede koncentracija mikroelemenata. Prosječne vrijednosti koncentracija (mg kg^{-1}) u listu između hibrida varirale su 97-164 (Fe), 76-110 (Mn), 17,3-34,7 (Zn) i 6,1-10,1 (Cu), a u zrnu 16,7-27,5 (Fe), 3,5-5,3 (Mn), 15,6-19,4 (Zn) i 1,5-2,5 (Cu). Sadržaj proteina, ulja i škroba također je bio pod značajnim utjecajem hibrida, lokacije i godine, uz izuzetak utjecaja godine za sadržaj ulja, odnosno lokacije i godine za sadržaj škroba u zrnu kukuruza. Rezultati su pokazali da svojstva tla i vremenske prilike u međusobnoj interakciji bitno utječu na prinos i koncentracije mikroelemenata u biljci, što upućuje na daljnje istraživanje, zbog boljega shvaćanja složenog odnosa genotipa i okoline.

Ključne riječi: hibridi kukuruza, agroekološki uvjeti, mikroelementi, kvaliteta zrna

GENOTYPE AND AGROECOLOGICAL IMPACTS ON THE CONCENTRATIONS OF MICROELEMENTS AND MAIZE GRAIN YIELD

Doctoral thesis

Acquisition of mineral nutrients and their translocation and accumulation in the plant depend on the genotype and environmental factors. Therefore, the aim of the research was to determine genetic specificity of maize hybrids for concentrations of Fe, Mn, Zn and Cu in plant material and to determine the influence of agro-ecological conditions on both the microelements concentration in the leaves and grain, and the grain yield of maize. The field experiment was conducted with ten maize hybrids of different FAO groups (DRAVA 404, OS 430, OSSK 444, OS 499, OSSK 515, OS 5717, OSSK 552, OSSK 596, OSSK 602 and OSSK 617) over two years on two locations in Osijek-Baranja County. The experimental locations were differed in soil properties. Soil in Osijek is eutric cambisol, slightly acid to neutral reaction, while soil in Podgorač belongs to pseudogley type with very low pH. The two analyzed year were very different regarding climatological elements, especially

(1) Sveučilište Josipa Jurja Strossmayera u Osijeku, Poljoprivredni fakultet u Osijeku / Josip Juraj Strossmayer University of Osijek, Faculty of Agriculture in Osijek, Kralja Petra Svačića 1 d, Osijek (dario.iljkic@pfos.hr)

(2) Disertacija je obranjena na Sveučilištu Josipa Jurja Strossmayera, Poljoprivrednom fakultetu u Osijeku 6. veljače 2015. godine pod mentorstvom izv. prof. dr. sc. Mirte Rastije / Doctoral thesis was defended at Josip Juraj Strossmayer University of Osijek, Faculty of Agriculture in Osijek on 6th February 2015 tutored by Assoc. Prof. Mirta Rastija

in terms of rainfall. The year 2010 was extremely wet, while 2011 was less favorable for the maize growing because of drought period and higher average air temperature. The mean maize grain yield in the experiment was 8.61 t ha^{-1}. Combined analysis of variance was shown statistically significant effects of individual factors (hybrids, locations and years), as well as all interactions on grain yield, especially interaction locations x years. The higher yield was achieved in Osijek in comparison with Podgorač. The concentration of most microelements in leaf and grain were significantly ($P \leq 0.05$) influenced by all main factors and hybrids showed a certain genetic variation regarding microelements concentrations. Average values of the concentrations (mg kg^{-1}) in the leaf of hybrids ranged from 97 to 164 (Fe), from 76 to 110 (Mn), from 17.3 to 34.7 (Zn) and from 6.1 to 10.1 (Cu), and in grain from 16.7 to 27.5 (Fe), from 3.5 to 5.3 (Mn), from 15.6 to 19.4 (Zn) and from 1.5 to 2, 5 (Cu). Protein, oil and starch content in maize grain were significantly affected ($P \leq 0.05$) by hybrids, locations and years with the exception of the year impact on the oil content and the location and year on the content of starch in maize grain. Results showed that interaction of soil properties and weather conditions considerably affect maize yield and concentration of microelements in plant. Also, this dissertation suggests further research for better understanding of the complex relationship of genotype and environment.

Key-words: maize hybrids, agroecological conditions, microelements, grain quality