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FOLIAR APPLICATION OF ZINC IN ALFALFA PRODUCTION

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INTRODUCTION

Fodder plants are the most important source of energy for livestock, and in addition, are also a natural source of minerals in the diet of ruminants. In cases of insufficient provision of plants with minerals, several measures can compensate for the lack in the diet of livestock. One of the ways is biofortification, enrichment of plants with microelements through cultivation or using biotechnology. Zinc (Zn) malnutrition in human and animal has been recorded in Serbia and worldwide, and according to this problem, zinc has emerged as an element suitable for the biofortification of staple food and forage crops. This study was conducted in order to investigate the effect of foliar fertilization with Zn and combination of Zn and Se, on the yield and mineral composition of alfalfa.

MATERIAL AND METHOD

The field experiments were conducted in the vicinity of Subotica, Serbia under rainfed conditions from 2014 to 2015

The investigated foliar treatments were as follows:
i) control without foliar fertilization
ii) Zn 0.5 kg ha $^{-1}$
iii)1 kg Zn ha^{-1} (as $ZnSO_4 \times 7H_2O$),
iv) 0.5 kg Zn ha^{-1} and Se 10 g ha^{-1} (as Na_2SeO_4).
The fertilization doses were divided into two foliar applications. The first application was carried out at a plant height of 10 cm, and the second application was seven days after the first, only before first cut.

Table 1. Chemical properties of soil before setting up the experiment

depth cm	pH in KCl	pH in H_2O	$CaCO_3$ %	Organic matter %	Total N %	AL-P_2O_5 mg 100g^{-1}	AL-K_2O mg 100g^{-1}	DTPA-Zn mg kg^{-1}
0-30	7.39	8.02	19.3	2.53	0.13	21.2	14.0	3.36

RESULTS

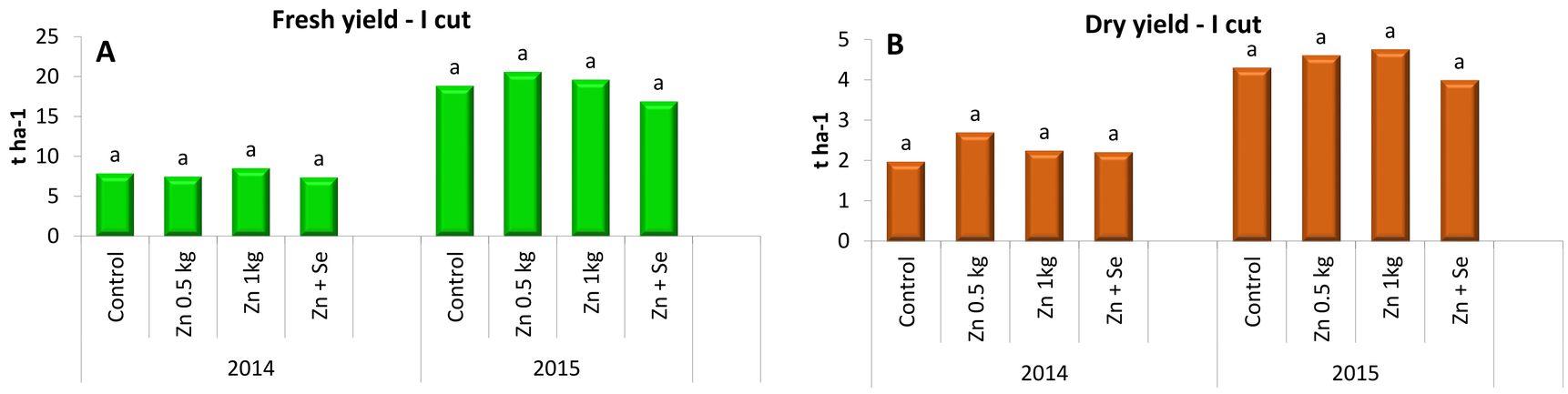


Figure 1. Effect of fertilization with Zn zinc on fresh (A) and dry matter B) yield in first cut

Table 2. Effect of fertilization with zinc on macro (P and K) and microelement (Cu, Fe and Mn) concentration in alfalfa biomass (first cut)

	Treatment	P %	K %	Cu mg kg^{-1}	Fe mg kg^{-1}	Mn mg kg^{-1}
2014	control	0.25 a	1.50 a	6.41 a	417 ab	55 a
	Zn 0.5 kg	0.25 a	1.30 a	7.37 a	591 a	62 a
	Zn 1 kg	0.24 a	1.62 a	9.63 a	493 ab	56 a
	Zn + Se	0.25 a	1.45 a	8.02 a	336 b	55 a
2015	Control	0.22 a	1.62 a	7.19 a	113 a	26 a
	Zn 0.5 kg	0.23 a	1.41 a	7.26 a	129 a	26 a
	Zn 1 kg	0.21 a	1.27 a	8.03 a	112 a	26 a
	Zn + Se	0.21 a	1.49 a	8.97 a	119 a	26 a

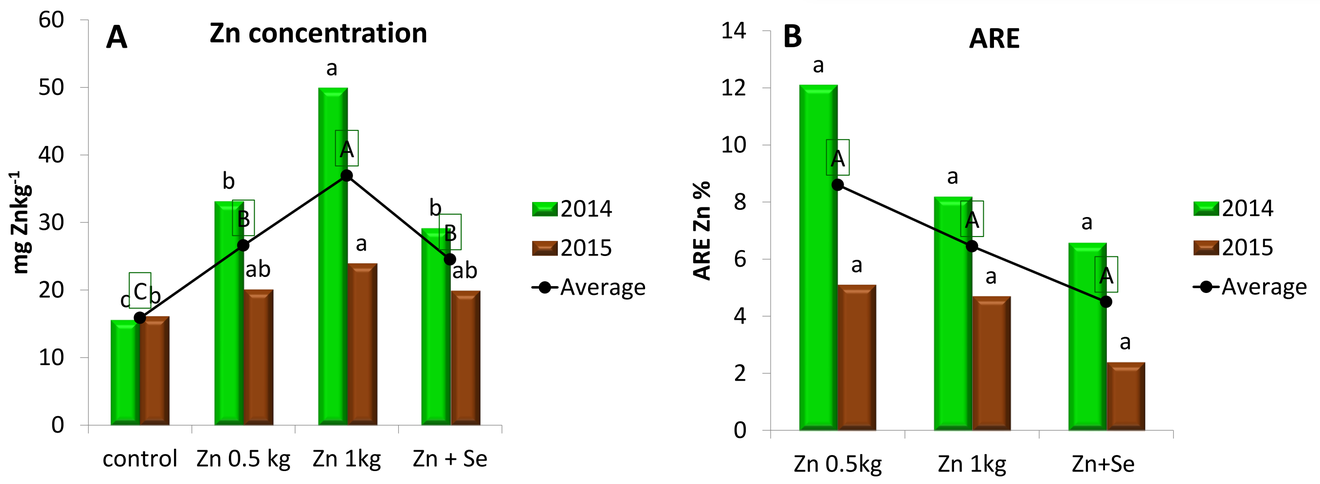


Figure 2. of Zn fertilization Zn content (A) in alfalfa biomass and apparant recovery efficiency (B)

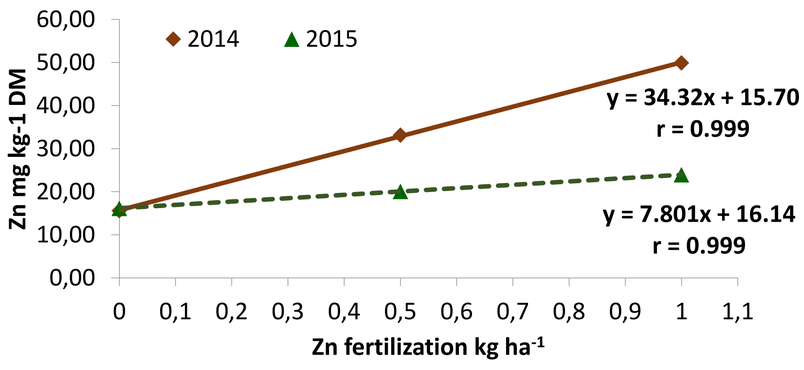
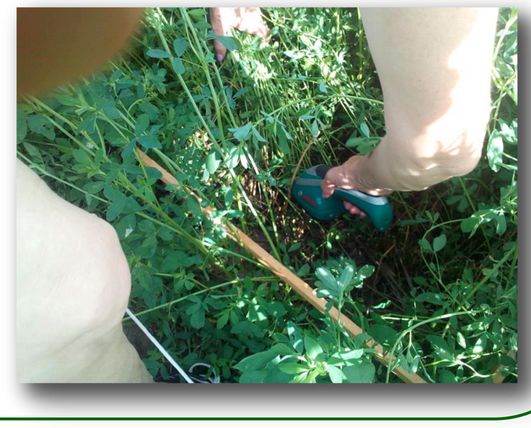


Figure 3. Correlation between Zn fertilization and its content in alfalfa biomass

$$ARE\ (\%) = \frac{A_F - A_C}{F} \times 100$$

A_F – Zn accumulation* (kg/ha) in the fertilized treatment
A_c - Zn accumulation (kg/ha) in the control treatment
F - Amount of applied Zn (kg) through fertilizers
* Zn accumulation = measured Zn concentration in plants (mg/kg)*dry yield (kg/ha)



CONCLUSION

Zinc fertilization in alfalfa cultivation can be an important measure for improving the Zn status in plants and accordingly in a cattle diet, too. Application of this element led to a higher Zn concentration in the feed, without negative effect on yield. Also, higher doses of Zn fertilizers should be investigated in order to achieve higher Zn content in plants in favourable years with greater yields.

ACKNOWLEDGEMENT

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