THE IMPACT OF SOYBEAN-PROSO MILLET INTERCROPPING ON PRODUCTIVITY AND MICRONUTRIENT ACCUMULATION IN BIOMASS

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Introduction

- Iron (Fe) and zinc (Zn) are limiting factors for plant growth and development. The yield and quality of biomass are related to their uptake from the soil, which can be facilitated by:
  - intercropping of complementary crops (favorably affect the utilization of natural resources);
  - using an ecofriendly fertilizer, biofertilizer (provides more available forms of nutrients and thus additionally influence the productivity of crops).
- Therefore, combining of intercropping with a biofertilizer seems to be a good way to boost biomass production in a sustainable agriculture.

Matherials and methods

- Soybean (*var*. Selena) and proso millet (*var*. Biserka) were sown in three intercrop combinations (S-M, SS-MM and SS-MMMM), as well as sole crops, during 2018 and 2020.
- The effect of the biofertilizer Coveron (containing *Glomus sp.* and *Trichoderma*) was also investigated.
- Land equivalent ratio was calculated according to the formula given by Mead and Willey (1980).
- Concentration of Fe and Zn was determined by ICP-MS.
- Fe-LER and Zn-LER were calculated as: $\mathrm{NLER} = \frac{NYis}{NYss} + \frac{NYim}{NYsm}$, where NY represents specific nutrient yields per land area.

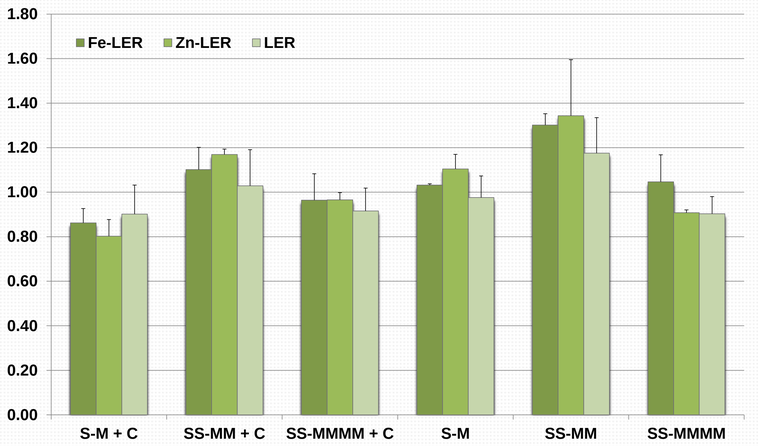
The aim of this research was to examine the mutual influence of the biofertilizer and different intercrop combinations of soybean and proso millet on biomass yield and concentration of essential minerals (Fe, Zn), shown as LER, Fe-LER and Zn-LER.

Results and discussion

Soybean	Fe (mg kg^{-1})	Zn (mg kg^{-1})
2018	79.08^{a}	31.18^{a}
2020	142.74^{b}	25.77^{b}
SS	107.73^{a}	24.07^{a}
S-M	102.10^{a}	28.25^{a,b}
SS-MM	113.34^{a}	29.92^{b}
SS-MMMM	120.48^{a}	31.67^{b}
C	113.00^{a}	28.16^{a}
CΘ	108.83^{a}	28.80^{a}
Anova *p* values		
Y	0.00*	0.00*
T	0.59	0.01*
B	0.67	0.72

Proso millet	Fe (mg kg^{-1})	Zn (mg kg^{-1})
2018	64.65^{a}	19.35^{a}
2020	51.22^{b}	14.25^{b}
SM	57.59^{a}	19.14^{a}
S-M	58.68^{a}	15.36^{b}
SS-MM	60.83^{a}	17.01^{a,b}
SS-MMMM	64.64^{a}	15.70^{b}
C	60.03^{a}	15.93^{a}
CΘ	60.84^{a}	17.67^{a}
Anova *p* values		
Y	0.00*	0.00*
T	0.42	0.03*
B	0.80	0.08

SS-MM and SS-MMMM combinations contributed to greater accumulation of Fe in biomass of soybean and proso millet. In regard to Zn concentration, situation was the opposite. While all intercrop combinations expressed the positive effect on accumulation of this element in soybean, more Zn was absorbed by proso grown as sole crop in relation to the intercrops.



Fe-LER and Zn-LER values showed that the influence of intercropping had significantly highlighted SS-MM combination. The effect of the biofertilizer could be observed just in the case of Fe-LER, where Coveron expressed negative impact.
Similarly, the LER value for yield was >1 only in SS-MM combination, making this combination the most favorable.

It can be concluded that soybean-proso millet intercropping had the beneficial effect on productivity and micronutrient absorption by biomass, emphasizing SS-MM combination as the most efficient!