

THE EFFECT OF AMINO ACID PREPARATION AND FOLIAR FERTILIZERS ON MAIZE YIELD AND QUALITY

Zoltán FUTÓ – Gábor BENCZE

Hungarian University Agricultural and Life Sciences, Institute of Environmental Sciences, Department of Irrigation and Melioration, 5540 Szarvas, Petőfi street 9. Hungary, futo.zoltan@uni-mate.hu

Abstract: We made the foliar fertilization experiments in the near of Szarvas in 2022 in cooperation with Hed-Land Hungária Ltd. The soil of the experimental area is deep carbonate chernozem meadow soil. The main characteristics of the soil of the experiment: its physical type is clay loam, its chemistry is acidic or weakly acidic, the cultivated layer does not contain CaCO_3 , based on the humus content, the N-supply of the soil is medium.

In the experiment, 5 foliar fertilizer and amino acid treatments were examined, supplemented by an untreated control plot. The treatments had a positive effect on maize yields in the experiment. The achieved average yields increased by 7.80 – 25.61% the average yield of the control, untreated plots (7.56 – 9.37 t/ha). The average yield achieved in the treated plots reached the limit of the statistically difference, so the effect of the treatments was significant. The highest yield average was obtained in the 2x Aminocore 2 l/ha and Ionic Zn 0.2 l/ha treatments (9.37 t/ha). During the experiment, we also examined the changes in the quality of the maize grain. Protein%, starch%, and oil% were measured in the study. We were able to establish that no clear correlation could be established between the treatments and the quality parameters. The values measured in the untreated control plots sometimes improved and increased in the treated plots, while in other cases we could see a slight decrease. Amino acid preparations therefore have a significant effect on the average yield, the quality is more of a genetically determined property.

• Introduction

Maize (*Zea mays* L.) is one of the world's major cereal crops, ranking third in importance after wheat and rice (Lashkari et al., 2011; Futó and Sárvári, 2015). Foliar application of nano-zinc oxide (ZnO) is an environmentally safe strategy that alleviates zinc (Zn) malnutrition by improving biochemical attributes and storage proteins of grain. Inoculation of *B. subtilis* and *P. fluorescens* with foliar nano-ZnO application is considered a sustainable and environmentally safe strategy for improving the biochemical, metabolic, nutritional, and productivity attributes of maize. (Jalal et al. 2023).

Numerous studies have shown the importance of amino acids in the plant's physiological activities, mainly at the cellular level. Since they are highlywater-soluble, the positive effects of applying amino acids might be due to their internal function within the cell as an osmo-regulator. This increases the concentration of cellular osmotic components (Abdel-Mawgoud et al., 2011), stimulating cell growth and consequently increasing the plants' chemical composition, as well as the growth, yield and quality of the harvest (Awad et al., 2007; Abdel Aziz, 2009; Thomas et al., 2009; Abd El-Aal et al., 2010). Also and due to the chelating effect of amino acids on micronutrients, when applied together with micronutrients they facilitate the absorption and transport of these micronutrients inside the plant, since they also positively affect cell membrane permeability (Ibrahim et al., 2010).

• Material and method

We made the foliage fertilization experiments in the near of Szarvas (Hungary, Békés Country) in 2022 in cooperation with Hed-Land Hungária Ltd. The soil of the experimental area is deep carbonate chernozem meadow soil. The experiment was carried out in 4 replicate small-plot experiments. The size of the experimental plot was 48 m². The preparations were applied with a manual sprayer in the phenological phases of the BBCH scale indicated in the research plan, using a droplet size and pressure similar to field sprayers.

The treatments were:

- Aminocore 3l/ha (with weed control)
- Aminocore 5l/ha (with weed control)
- Aminocore 2l/ha + Ionic Zn 0.5l/ha (with weed control) then Aminocore 2l/ha + Ionic Zn 0.5l/ha (in 50% blooming with drone)
- Aminocore 2l/ha + Zsémix 2l/ha (with weed control)
- Ionic Zn 0.5l/ha (with weed control)
- Control

In the experiment, we continuously carried out pathological reclamation, where we monitored the plant protection resistance of the different plots. We measured the average yield, and in addition to the yield results, the quality of the plant products was also tested. The statistical analysis of the experiment was evaluated with the SPSS for 26.0 program.

• Results and discussions

The treatments also had a positive effect on maize yields during the study. The yield averages achieved increased by 7.80 – 25.61% the average yield of the control, untreated plots.

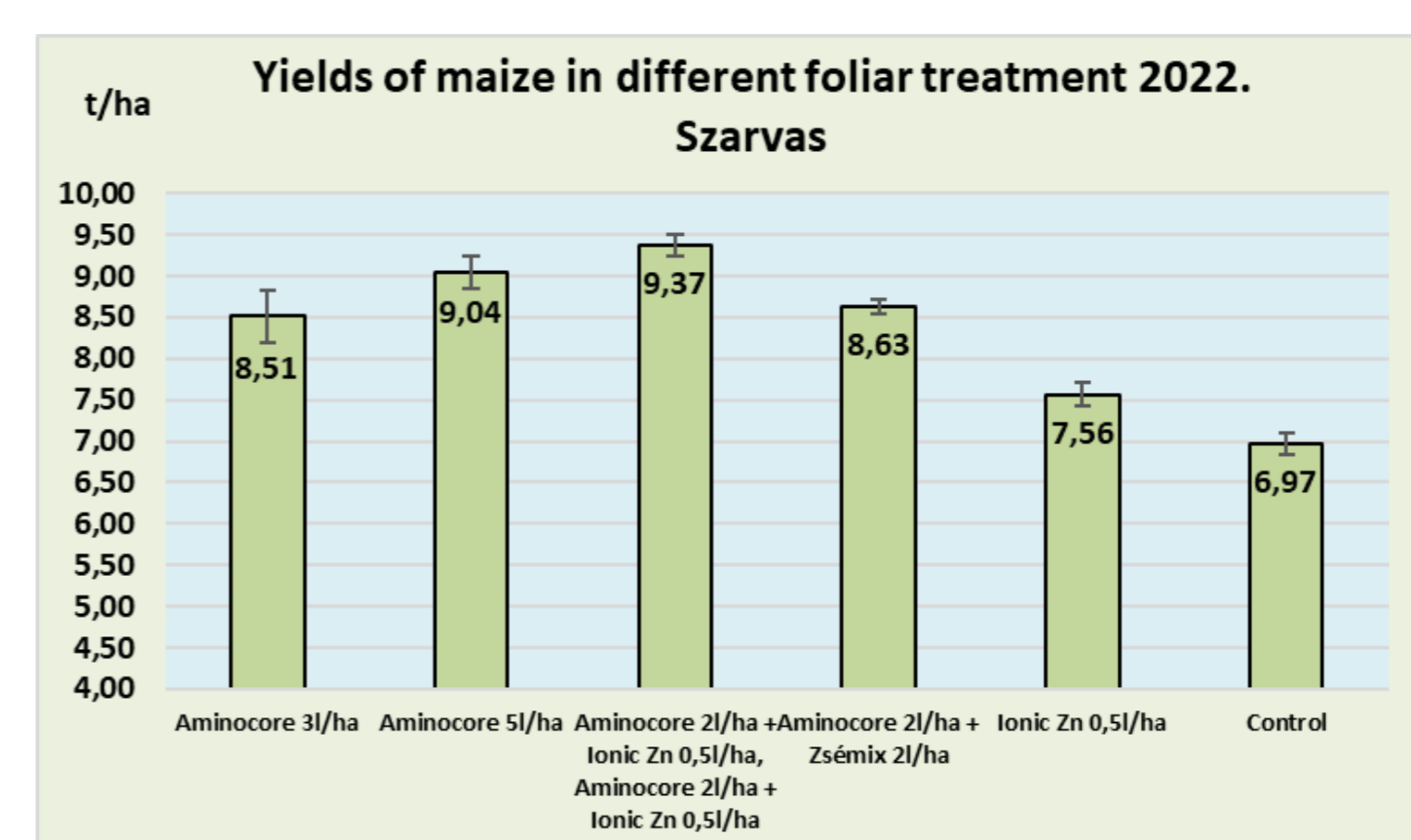


Figure 1. Yields of maize in different foliar treatment

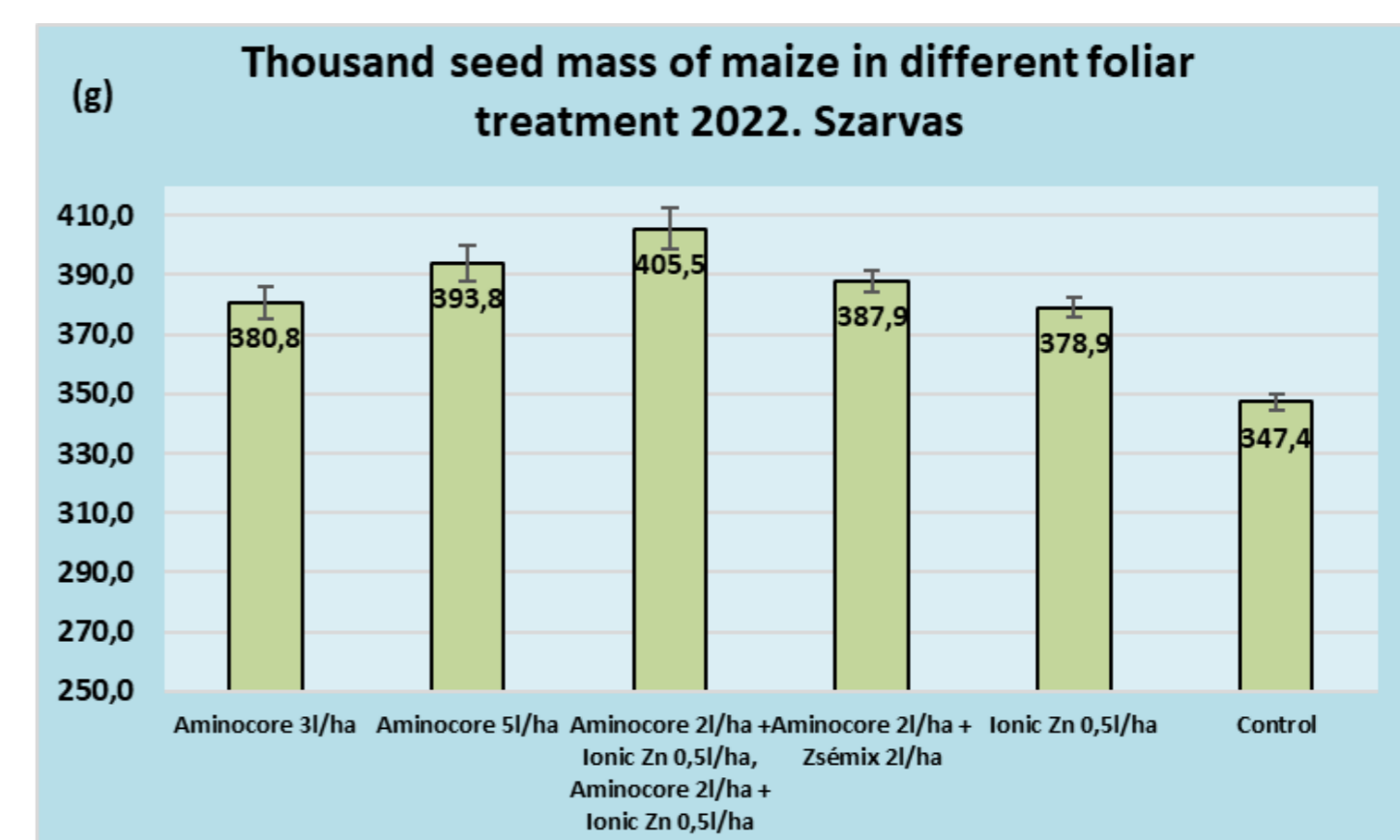


Figure 2. Thousand seed mass of maize in different foliar treatment

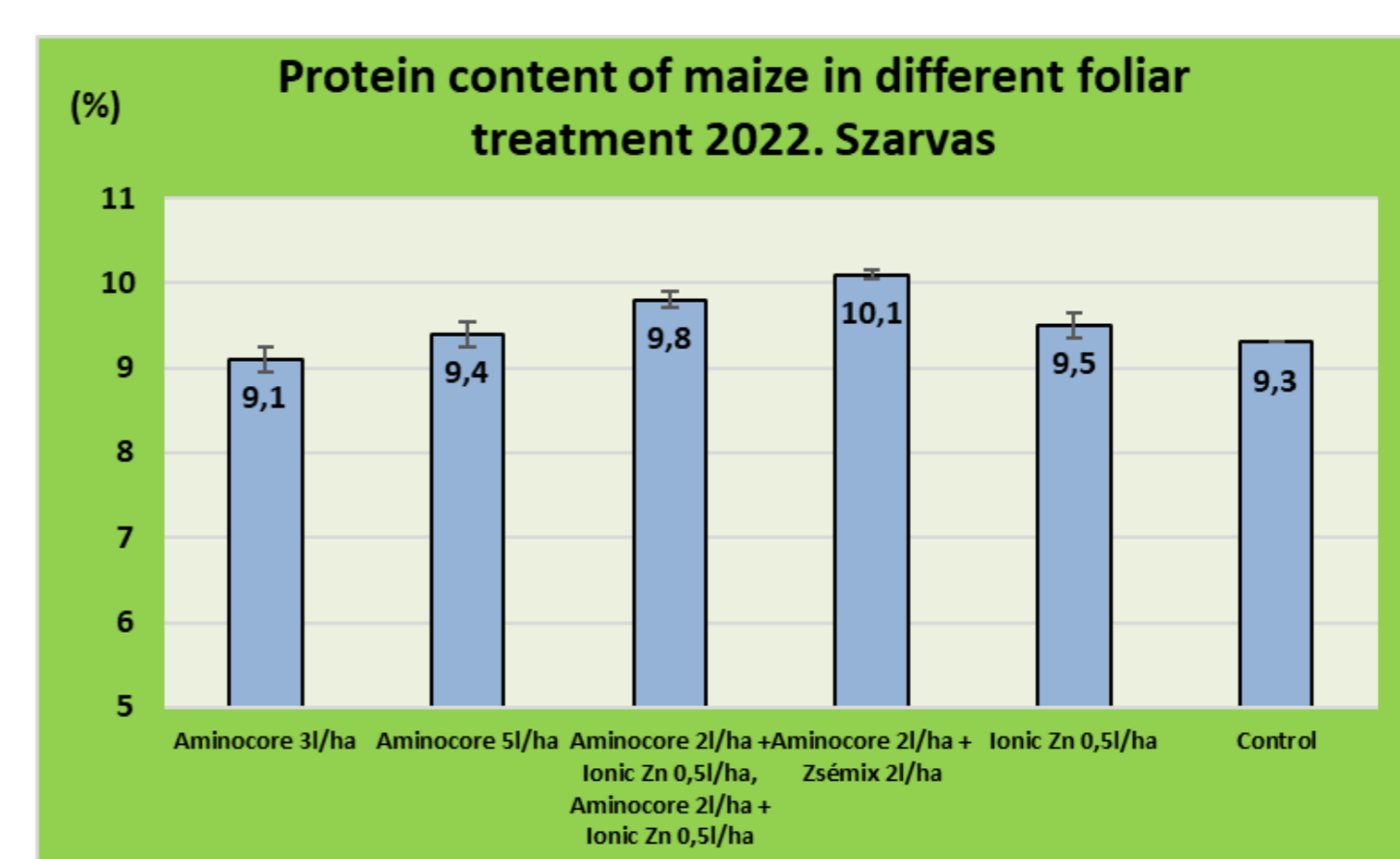


Figure 3. Protein content of maize in different foliar treatment

• Conclusions

The technology of amino acid foliar fertilization had a very good effect on the average yield of maize in the experiment. The increase in the average yield was significant, 7.80 – 25.61%. The highest average yield increase was obtained in the twice applied Aminocore 2 l/ha + Ionic Zn 0.5 l/ha treatment 9.37 ± 0,138 t/ha. We were able to establish that no clear correlation could be established between the treatments and the quality parameters. Amino acid preparations therefore have a significant effect on the average yield, the quality is more of a genetically determined property.