

## IMPROVING OF MAIZE YIELD STABILITY WITH FOLIAR FERTILIZERS

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**Abstract:** Increasing the yield stability in crop production is very important. Foliar fertilizers can be suitable for this purpose. In our study the effects of different foliar fertilizers were investigated for maize production. The experiment was set up in three replications, using random block design on the area of Hungarian University of Agriculture and Life Sciences in Szeged. The soil deeply salt meadow chernozem. The examined maize hybrid was DKC 4555. We applied three foliar fertilizers individually and combined with each other. 2021 was unfavourable year for maize. The amount of precipitation was lower by 113.58 mm than the average in the vegetative period of maize. We processed the obtained data by single factor variant analysis. The yield of the untreated control plot was 2.44 t ha<sup>-1</sup>. By using of foliar fertilizer treatments, we got higher yields (2.48-3.14 t ha<sup>-1</sup>). Although the foliar fertilizer treatments resulted in maximum 29% higher yield in this experiment, but statistically it was not significant. Based on our results we can establish, that using foliar fertilizers can improve the yield stability of maize.

Keywords: maize, foliar fertilizer, yield stability

### 1. Introduction

Cereals (e.g corn, wheat, rice) are the most important field crops and these are produced on the largest area worldwide. Their production is of basic importance, because they can be utilized in many different mode (e. g human consumption, forage, industrial processing). Cropping structure of Hungary is mainly focused on cereals. Maize and wheat have the largest sowing area (Menyhért 1985, Nagy & Sárvári 2005, Karancsi 2015).

Maize is one of the most important field crops produced and several agrotechnical factors play determining role in its production technology from the aspect of yield amount, yield safety, as well (Pepó 2014, Csajbók 2016, Sárvári 2020, Pepó 2022, Sárvári & Kutasy, 2023).

Due to the even more occurring weather anomalies -as result of climate change- far more extreme weather and climatic occurrences can be observed than previously (Karancsi 2015).

In 2022, there was a very severe drought in Hungary. In such circumstances, the importance of foliar fertilization increases. Several research report on the use of foliar fertilization of maize and its results (Y. Hu et al. 2008, Jakab et al. 2017, Kith et al. 2023,

## 2. Materials and methods

### 2.1. Soil properties

The field experiment was set up in 2021 on the area of Hungarian University of Agriculture and Life Sciences in Szeged. The soil was deep salty meadow chernozem, its nitrogen content was medium, phosphorus and potassium content were well supplied (*Table 1*).

**Table 1:** Soil properties

<b>pH</b>	<b>Humus (%)</b>	<b>P2O5</b>	<b>K2O</b>	<b>Soil plasticity value</b>
<b>7.9</b>	<b>3.0</b>	<b>150</b>	<b>250</b>	<b>42</b>

Source: Hungarian University of Agriculture and Life Sciences (2019)

### 2.2. Weather conditions

The year 2021 was unfavourable for maize production. The precipitation was 113.58 mm less than the long-term average in the vegetation period of maize (*Table 2*).

**Table 2:** Rainfall in the vegetative period of maize (2021)

<b>Month</b>	<b>Precipitation (mm)</b>	<b>Long-term average of precipitation (mm)</b>	<b>Deviation from average (mm)</b>
<b>April</b>	<b>30.40</b>	<b>37.15</b>	<b>-6.75</b>
<b>May</b>	<b>70.60</b>	<b>64.56</b>	<b>6.04</b>
<b>June</b>	<b>10.70</b>	<b>78.85</b>	<b>-67.15</b>
<b>July</b>	<b>40.30</b>	<b>61.30</b>	<b>-21.00</b>
<b>August</b>	<b>33.60</b>	<b>37.78</b>	<b>-5.18</b>
<b>September</b>	<b>30</b>	<b>49.55</b>	<b>-19.55</b>
<b>Total</b>	<b>215.60</b>	<b>329.18</b>	<b>-113.58</b>

Source: Author's own editing.

### 2.3. Agrotechnical background

The field experiment was set up in three replications organised in random block design. The size of the plots was 14 m<sup>2</sup>. The pre-crop was winter barley. In the autumn of 2020, 200 kg/ha NPK fertilizer (15:15:15) was applied. In the spring of 2021, 40 kg/ha nitrogen top fertilizer was applied. The sowing time was on 24 th of April. The maize hybrid was the DKC 4555 (FAO 340).

The foliar fertilizers were applied with a backpack sprayer in the dosage recommended by the manufacturers, in the 6-8-leaf stage of the maize plants.

three foliar fertilizers were used alone and in combination: Algafix, Amalgerol, Fitohorm Turbo Zn, Algafix+Amalgerol, Algafix+Fitohorm Turbo Zn, Amalgerol+Fitohorm Turbo Zn.

Algafix is a microbiological biostimulator, containing Balaton algae producing cytokinin, thereby helping the growth of plant shoots.

Amalgerol is a complex preparation, which contains plant extracts, plant essential oils and mineral oils.

Fitohorm Turbo Zn containing zinc, which is the most important microelement of maize.

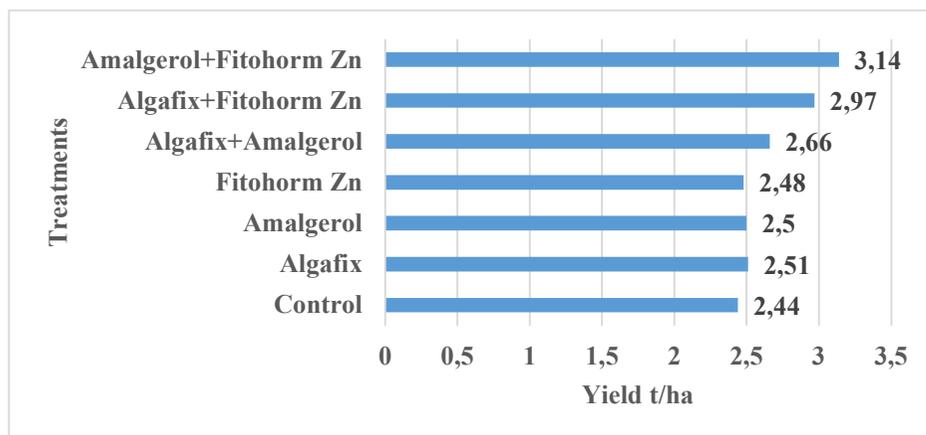
We processed the obtained data by single factor variant analysis.

### 3. Results

The average yield of control plot was 2.44 t/ha. Under the influence of foliar fertilizers, the yield of maize was increased. When the products were sprayed out individually, minimal (0.04-0.7 t/ha) yield surplus was obtained. The highest yield surplus was achieved by Algafix treatment (0.07 t/ha).

If the products were sprayed out combined with each other, the yield surplus was higher (0.22-0.7 t/ha). The highest yield surplus (0.7 t/ha) was measured in the treatments with Amalgerol+Fitohorm Zn. (*Figure 1*)

**Figure 1:** The yield of maize in different treatments



Source: Author's own editing

#### 4. Discussion

Due to lack of precipitation the yield of maize in control treatment was low (2.44 t/ha). By using of foliar fertilizers, we got higher yields (2.48-3.14 t/ha). Although the foliar fertilizer treatments resulted in maximum 29% higher yield in this experiment, but statistically it was not significant.

Based on our results we can establish, that using foliar fertilizers can improve the yield amount and yield stability of maize too.

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