

Investigation of the effects of foliar fertilization on two maize hybrids' physiological characteristics under irrigated conditions

Brian Ssemugenze^{1*}, Arpad Illes¹, Csaba Bojtor¹, Akasairi Ocwa¹, Brigitta Tóth², Janos Nagy¹

¹Institute of Land Use, Engineering and Precision Farming Technology, Faculty of Agricultural and Food Sciences and Environmental Management, University of Debrecen, 138 Böszörményi street, 4032, Debrecen, Hungary

²Institute of Food Science, Faculty of Agricultural and Food Sciences and Environmental Management, University of Debrecen, 138 Böszörményi street, 4032, Debrecen, Hungary

*Corresponding author, Email: sbrian@mailbox.unideb.hu.

Abstract

Exponential population growth requires increased food production amidst several crop stresses like drought and soil infertility that impact plant growth and production. Maize recognized as a salient cereal crop globally. Foliar fertilisation and irrigation among precision practices that deter crop stress. Therefore, the study objectively evaluated the effects of foliar fertilization on different physiological parameters of two maize hybrids (FAO 490 and FAO 290) under irrigated conditions at Látókép Crop Experimental Site, University of Debrecen, Hungary during year 2023. The experimental design was a randomized complete block design. Foliar fertilizer treatments consisted: nitrogen (10 g/l), zinc (8 g/l), K₂O (8.5 g/l), P₂O₅ (0.83 g/l) and sulphur (8.93 g/l). Surface drip irrigation lines were laid in every row near the plants at the intensity of 3 litres per hour controlled by hydra wise app, managed by nearby meteorological station. Data on selected physiological parameters namely plant height, leaf area index, NDVI (Normalized Difference Vegetation Index) and relative chlorophyll content (Soil Plant Analysis Development values) was collected at V12, VT, R4 and R6 stages. Data analysis comparing foliar fertilization effect was done using T-test. There was no significance difference on LAI, NDVI, SPAD and plant height for the two hybrids due to foliar application when compared with control. However, comparing hybrid and trait interaction showed that plant height had a significant difference ($P < 0.001$) between the two hybrids. At R6 and V12 stages lower values of all traits were recorded, whereas at R4 and VT stages high values of NDVI, plant height, SPAD and LAI were recorded. FAO290 had higher LAI values than FAO490 at both V12 and VT stage however no significant differences when compared to control. Findings imply that physiological growth of maize mainly depends on the way hybrids and traits interact when exposed to foliar fertilization.

Keywords: *foliar fertilization, irrigation, maize, physiological parameters, plant stress*

Project no. TKP2021-NKTA-32 has been implemented with the support provided by the Ministry of Culture and Innovation of Hungary from the National Research, Development and Innovation Fund, financed under the TKP2021-NKTA funding scheme.