

Analysis of the correlation between yield results and soil in the case of different genotype maize hybrids

Károly KITH – Csaba BOJTOR – Árpád ILLÉS – Zsuzsanna DOROGI – Annabella ZELENÁK

Institute of Land Use, Technology and Regional Development, Faculty of Agricultural and Food Sciences and Environmental Management, University of Debrecen, 4032 Debrecen, Böszörményi str. 138.; Email: kithkaroly@agr.unideb.hu

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Introduction

Currently, cereal crops have the largest sowing area in Hungary. Cereals were grown on 56% of the utilized arable land. Of the above area, maize was sown 955,881 hectares in Hungary (HCSO). Our current challenges include the maintenance of maintaining the yield safety of maize, which is defined by genetic diversity. There is a steady improvement in terms of the yield safety of hybrids which is the result of the breeding of new hybrids. Hybrids involved in cultivation are genetically different, they show different reactions to the same agrotechnical and ecological factors. The aim of breeding is to maximize genetic yield potential. Considering the local characteristics of production areas, the most suitable hybrids shall be selected (NAGY, 2006). The higher the FAO number of a maize hybrid, the longer is its breeding time and potential fertility. In Hungary, FAO-200-500 maize hybrids can be produced economically. The growth rate of maize is influenced not only by the biological and genetic background, but also by the location of production and its climatic conditions (NAGY, 2012). The length of the main sprout also depends on the hybrid and the conditions (BERZSENYI, 2012).

Materials and methods

The trial involved in present article is situated at the Látókép Experimental Site of the University of Debrecen.

The soil structure of the area is calciferous chernozem. The Arany plasticity index is around 43-47. Humus content of the upper 0-25 cm of the soil is 2.57%. Water management characteristics of the soil are favourable, it is characterised by medium water fixation. Average depth of ground water is 3-5 m. It has a moderately acidic pH of 6.3-6.5. Climatic weather conditions are often characterised by continental and extreme factors. In terms of the growth period of 2018, there was a total of 317 mm precipitation, which is 22 mm less than the average value of 50 years. The trial was set up following the design of Prof. Dr. János NAGY, featuring early and medium maturity hybrids, which have a genetic profile in compliance with the current requirements.

Agro-technical characteristics of the trial:

The area of the trial is 0.29 ha. Its green crop is winter wheat; tillage methods: disc, subsoiling; nutrient supply 30kg N, 78kg P, 78kg K. In spring: 135kg N+35kg CaO+25kg MgO, then in June 54kg N+14kg CaO+10kg MgO fertilizer was applied. Between 23.07.2018 and 14.08.2018 8 mm of irrigation water was applied every two days through the installed irrigation system.

Results and discussion

Present study deals with the correlation of collected soil samples and the measured yield results. Six hybrids were selected from the trial. Following the collection of soil samples, the analysis of the samples was carried out in an accredited laboratory.

The results are the following:

Table 2: Soil samples results

Soilsamples results (mg/kg)						
Hybrids	H1	H2	H3	H4	H5	H6
Nitrogen	10	24	9	16	11	5
Potassium	150	171	186	201	198	164
Phosphorus	84	131	183	172	168	94
Zinc	0,6	0,6	0,7	0,7	0,7	0,6

The analytical results of the study show the outstanding differences in terms of the different chemical elements. The low zinc content in the soil suggests that zinc was utilized by plants with high efficiency; they incorporated it into their system, which largely contributes to yield growth. There are large differences in terms of phosphorus, as in the soil sample of the H3 hybrid, the phosphorus content was 183 mg/kg and in the soil sample of H1 it was 84 mg/kg. There was no similar fluctuation in terms of potassium. Interesting results can be seen with regard to nitrogen; with the second highest nitrogen content of 16 mg/kg in the case of the H4 hybrid with the highest yield, whereas the yield of the highest nitrogen content sample (24 mg/kg) is only the fifth amongst the analysed hybrids.

Conclusions

Cereals were grown on 56% of the utilized arable land Hybrids involved in cultivation are genetically different, they show different reactions to the same agrotechnical and ecological factors. The trial involved in present article is situated at the Látókép Experimental Site of the University of Debrecen. The trial was set up following the design of Prof. Dr. János NAGY, featuring early and medium maturity hybrids, which have a genetic profile in compliance with the current requirements. Present study deals with the correlation of collected soil samples and the measured yield results.

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