

Phenometric comparison of different genotype and maturity maize hybrids

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Introduction

Cereal crops are the most important plant group in the world and in Hungary as well. In 2016, the total amount of harvested maize yield was approximately 1 billion tons. Yield safety of hybrids has increased and their productivity has been steadily improving due to breeding. Hybrids involved in cultivation are genetically different, they show different reactions to the same agro-technical 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. The growth rate of maize is influenced not only by the biological background, but also by the location of production and climate (NAGY, 2012). The length of the main sprout also depends on the hybrid and the conditions (BERZSENYI, 2012).

Portable active remote sensing spectrometer Greenseeker and chlorophyll meter (SPAD 502) were used to determine NDVI and SPAD meter readings of corn at different growth stages. This paper studied the impact of nitrogen on the nutritional status of corn population, and simple, fast and non-destructive nutritional diagnosis methods of crop nitrogen status in the field (GUO Jian-hua et al. 2008).

Materials and methods

The trial is situated at the Látókép Experimental Site of the University of Debrecen. It is located 15 km from Debrecen, along the main road No. 33. The area is plain, balanced, and belongs to the calciferous chernozem soils in terms of soil genetics. It is high quality, has suitable water management and medium water storage capacity. It has a slightly acidic pH (pH 6.3-6.5). Its Arany plasticity index is around 43-47.6. Ground water can be found between 7-9 m, its humus content is 2.57 %. During the growth period of 2018, there was a total of 317 mm of precipitation, which is 22 mm below the average of 50 years. In terms of its distribution, there was 41 mm in July and a much higher amount in August (97 mm). Following the harvest of the winter wheat green crop, disc, subsoiling), 200 kg/ha of artificial fertilizer was applied in September. 200 kg/ha was applied during the spring tillage process and 78kg/ha in June. Between 23.07.2018 and 14.08.2018, 8 mm of irrigation water was applied every two days through the installed irrigation system.

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. Multiple measurements were carried out during the growth period. Plant

height, ear height, yield were measured and we measured SPAD and NDVI 11 times (GreenSeeker Model 505 device) (Table 1). We compared the phenological and yield results of three early (H1, H2, H3) and three medium maturity hybrids (H4, H5, H6).

Results and discussion

Based on the analysis of the mean plant height of the two hybrid groups, it was found that, early maturity hybrids achieved higher results (303.6 cm), and they also showed larger values in terms of ear height (127 cm). However, the analysis of the leaf area index resulted in finding that medium maturity hybrids have larger leaf area (3.15 m²/m²) and they also surpassed the early hybrids in terms of yield results; they reached a record result of 21.23 t/ha. Comparison of the SPAD values of early H2 and medium H6 hybrids showed that lower FAO hybrids had higher values with one exception in the case of every measurement time. Identical value changes can be recorded in the case of the two hybrids in the same measurement times.

Table 1: Results (Látókép, 2018)

Hybrids	FAO 300-399				FAO 400-499			
	H1	H2	H3	Average	H4	H5	H6	Average
Plant height (cm)	336	296	279	303.6	324	293	275	297.3
Ear height (cm)	134	128	119	127	139	114	123	125.3
LAI (m ² /m ²)	3.30	2.84	2.66	2.93	3.63	2.90	2.94	3.15
Yield (t/ha)	18.94	18.89	19.75	19.19	22.47	20.97	20.25	21.23

Conclusions

Early maturity hybrids reached a higher average plant and ear height, however it did not influence yield results, as higher FAO hybrids had better results by an average of 2 t/ha. Leaf area index was also higher in the case of the medium maturity hybrids. The lower producing H2 hybrid showed higher SPAD values in the case of every measurement as compared to the H6 hybrid.

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