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Professional paper

STUDY OF MAIZE HYBRIDS (*Zea mays species L.*) IN THE MUNICIPALITY OF DELVINË, SARANDA

Denada DËRVISHI[1], Moltine PREBIBAJ[1], Nikollaq BARDHI[1], Sergej QAMA[1], Valmir SALIJI [3], Alirami SALIJI [2]

[1*] *Faculty of Agriculture and Environment, Agricultural University of Tirana, Albania.*
[2*] *Faculty of Agriculture and Biotechnology, Department of Manufacturing Plant, University of Tetova, NMK.*
[3*] *Department of Plant Biotechnology, University "Ss. Cyril and Methodius" NMK.*
[*]*Corresponding Author: e-mail: nbardhi@ubt.edu.al*

Abstract

Maize is one of the most important crops in world agriculture and has a fairly large weight in the cultivated area. It is cultivated for various purposes: Bread, Livestock (silage), the beer industry, the oil industry, and for bio-energy.

Over five hundred different food items, dishes, and beverages are produced from maize. The production of hybrid seed has greatly influenced the increase in maize yield, both for grain and forage mass. For Albanian conditions, the study of the suitability of maize hybrids in different areas of the country is of great interest and importance, since hybrid seeds are imported and not produced locally.

The experiment included eleven hybrids imported from the companies: ARLI International, Huqi, respectively, imported from Zemun Polje and Dekalb, and KWS. Eleven hybrids were included in the study, specifically: 5685, 5182, 6092, DKS and Kontigos, Inteligjence, Kalxon, Kulmos, and Kabriles from KWS, Germany.

The experiment was set up in Saranda according to a randomized block design with eleven variants and four replications. Saranda has over fifty years of experience in maize cultivation. The data was subjected to mathematical data processing to determine the best hybrid, which is adapted to the conditions of the area and gives the highest yield.

Keywords: *Maize, hybrid, plant height, leaves, ear, rows, grains, yield.*

1. Introduction

Maize is cultivated in all countries of the world for different purposes: consumption in different forms by people, for breeding, for industry, and bioenergy. Technological and hybrid studies for adaptation purposes by area are always necessary. This study also provides experimental data for the study of hybrids in Delvina.

2. Method of scientific work

The object of the work was to study the stability of some maize hybrids, for some morphological indicators of the plant, the ear, and the yield kv/ha. These indicators have been studied based on the manifestation of these important features in the conditions of the Delvinë field (Delvinë Municipality) in Bamatat. The basic materials that have been tested in this area have been systematized and subjected to mathematical analysis in relation to the yield determination model as the main indicator.

The aim: To determine the morphological and production indicators of corn hybrids in the conditions of the Delvina field and to determine the most suitable hybrid for this area.

2.1.A series of foreign hybrids were used as the basic material in this scientific research, specifically:

1. "Arli" International sh.p.k. Maize Institute Zemun Polje (Serbia)
2. Huqi sh.p.k. KWS (Germany) and Dekalb (Bulgaria)

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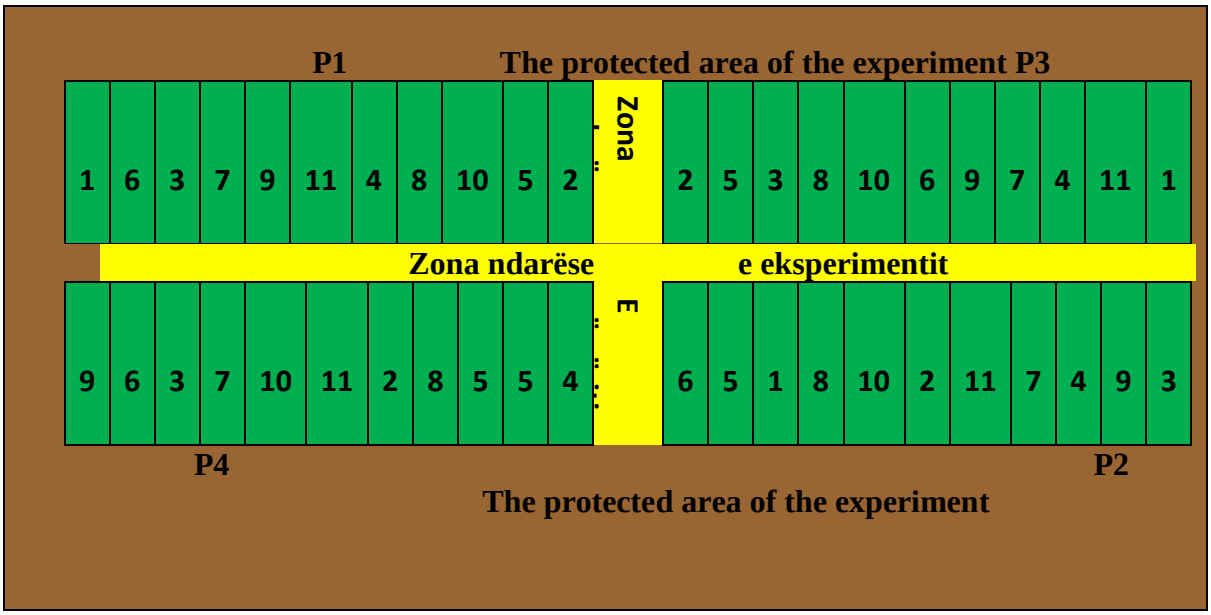
2.2. Place, time and method of conducting the study: The study was carried out in the Delvina Municipality (Saranda district). The soil where the experiment was set up was of light sub-clay composition with a deep base. The precursor plant was alfalfa.
The experiment was set up based on randomized block designs with four replications and eleven variants. Area of one variant 2.1x 5 = 10.5 m2.



Scheme No. 1 Random block (randomized)

2.3.Programmed phenological, morphological and production indicators

2.3.1. Phenological indicators

Germination-male flowering (days),
Germination-female flowering (days),
Germination-full maturity (days)

2.3.2. Biometric indicators in plants, ears and grains

Biometric indicators in plants:
The height of the plant in cm,
the height of the first ear of maize emerging from the soil,
The number of leaves
The length of the leaf in cm,
The width of the leaf in cm,

2.3.3. Biometric indicators on the ear

Length of ear in cm,
Number of rows in ear,
Number of grains in a row,
Number of grains per ear, thickness of the ear,
Cob thickness in cm,
Cob weight in grams

2.3.4. Biometric indicators in the grain

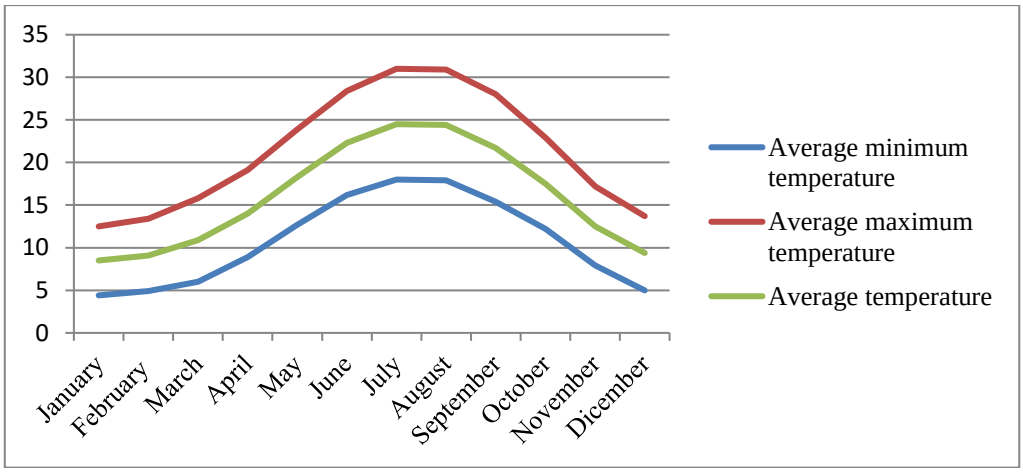
Weight of ear grains in grams,
Weight of 1000 grains
Yield kg/ha
The data were extracted on the basis of measurements on 20 plants in two repetitions from which the average was calculated where the relevant analyzes were performed.
The data were subjected to statistical analysis:
Indicators of analysis of variance,
minimum verified difference,
Correlation analysis
According to each case of processing, the data are grouped according to the relevant reports, illustrating them with graphic representations.

3. Results and their discussion.

In "results and discussion" the experimental part of the microthesis is addressed. Initially, the discussion focuses on phenological indicators and then continues with biometric indicators in plants, ears and grains, which concludes with the interpretation of the yield achieved by each hybrid, which is also the fundamental indicator of the work.

3.1. Climatic conditions where the experiment conducted: The experiment was set up according to a methodology designed in the Delvinë administrative unit, Saranda district.

3. 1.1. Temperatures



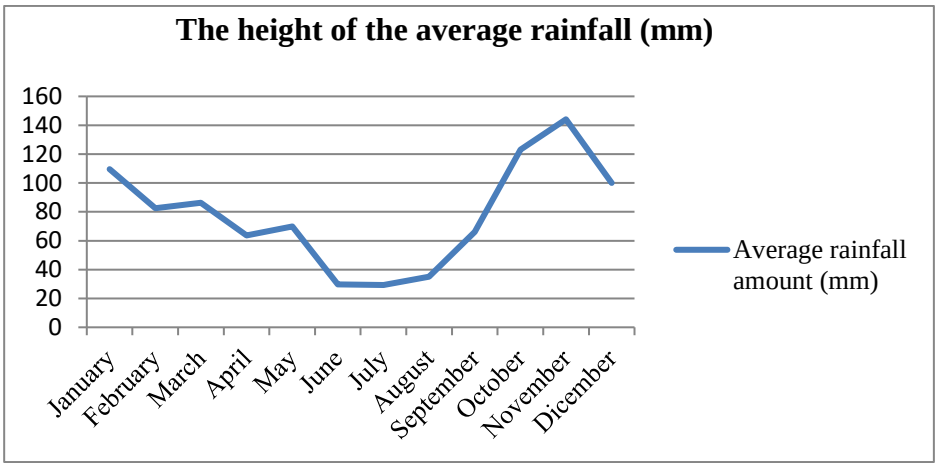
Graph. Nr 1 Monthly progress of average temperatures in perennial Saranda.

The annual temperature trend is suitable for potato growing in the Myzeqe area. One concern is the summer period with temperatures above 30^0 C, which is prolonged, causing plant stress
Average annual regime of climatic indicators in Saranda Table No. 1

No.	Indicators	Long-term average
1	Average annual temperature	16.8
2	Average annual minimum temperature	10.7
3	Average annual maximum temperature	23.4
4	Day with temperature $> 7^0$ C	338.4
5	Days with temperature $<0^0$ C	11.2
6	Days with temperature $> 30^0$ C	72.8
7	The amount of annual rainfall (mm)	944.6

8	Maximum 24-hour rainfall (mm)	133.8
9	Rainy days in the year	107.4
10	Solar radiation per year (hours)	2856.8

3.1.2. The rainfall



Graph no. 2. The monthly rainfall in Saranda.

The rainfall has an abnormal distribution compared to the plant's needs during the period June - August, creating a water shortage for maize. This has led to four to six irrigations, especially during the months of May and June.

3.1.3. Solar radiation (hours)

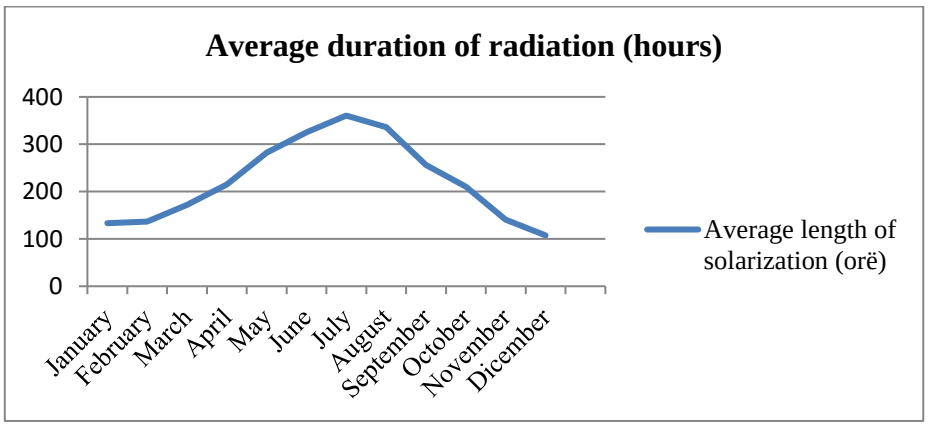


Chart No. 3. Monthly trend of solar radiation (hours) in Saranda

Solar radiation is suitable for the cultivation of maize. For normal development, 2200 – 3300 hours of solar radiation are needed. This requirement is well met in the conditions of Saranda, positively affecting the quality and chemical composition of the maize grain.
The soil in which the experiment was set up was analyzed and the indicators are: aqueous pH 6.95, saline pH 6.7, K.E. 0.100, Humus 2.3%, Nitrogen 0.15%, Phosphorus ppm 11.6, Potassium ppm 13.23, CaCO3 1.62%, sand 36.6%, silt 30.3% and clay 32.1%. They are suitable soil for maize cultivation.

3.2. Interpretation of phenological indicators of maize hybrids tested in the Municipality of Delvinë, Saranda district for 2023

Phenological stages include the qualitative changes that a plant undergoes in its morphology and physiology during growth and development. Regarding these indicators, in this study, attention was focused on the periods of full germination-male flowering, full germination-female flowering and full germination-full maturity, or as it is otherwise called, the vegetative period.

I. The morphological indicators

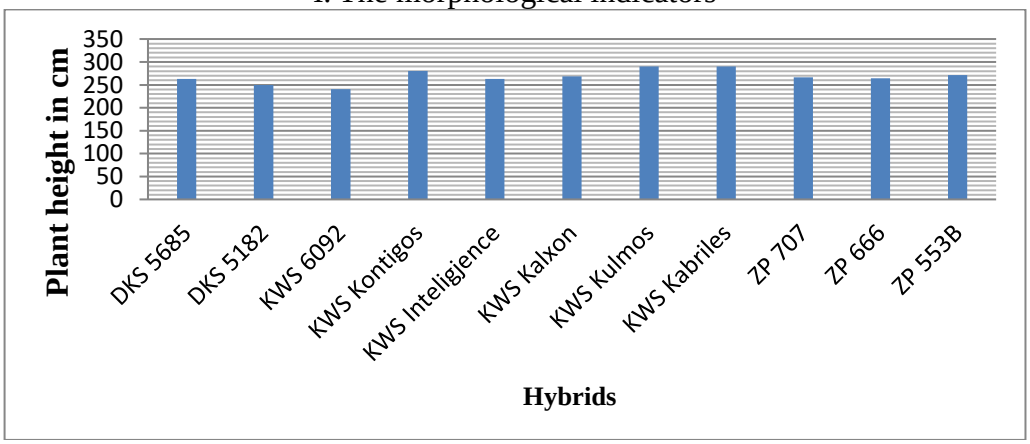


Chart No.4 Plant height in cm

The hybrids included in this study are of different origins: Germany, Bulgaria, and Serbia (ZP). As can be seen from the graph, the height of the plant is different. The highest height is achieved by the hybrids of KWS Germany and ZP Serbia. Hybrids vary greatly in plant height. The highest height is achieved by the hybrids Kontigos and Kabriles, both of which are KWS.

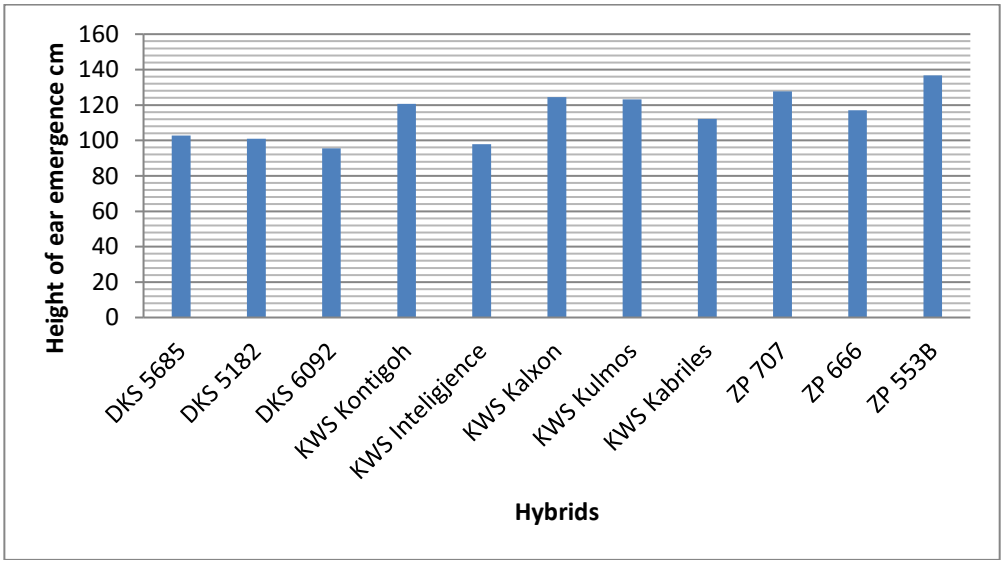


Chart No. 5 Height of ear emergence in cm

The height of the ear emergence does not show significant changes. The ear emerges higher, over 100 cm in the hybrids ZP 538, ZP 707, Kalxon, and Kulmos, and lower, i.e., under 100 cm in DKS 6092 and KWS Inteligente.

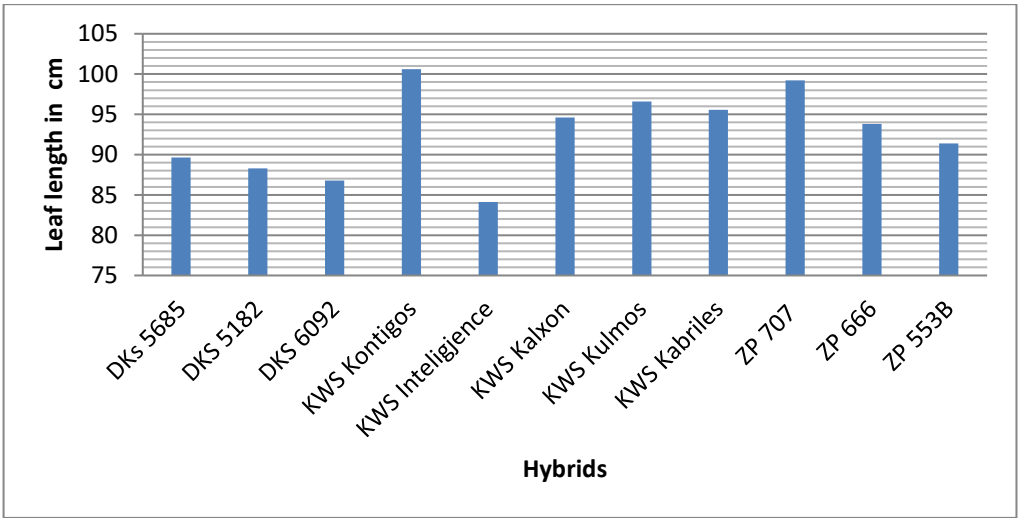


Chart No. 6 Length of the leaf in cm

Leaf length shows significant differences between the groups of hybrids according to their origin. The KWS, Kontigos, and ZP 707 hybrids have longer leaves, and the DKS 6092 and KWS Intelligent hybrids have shorter leaves, while the ZP hybrids have more complete stability.

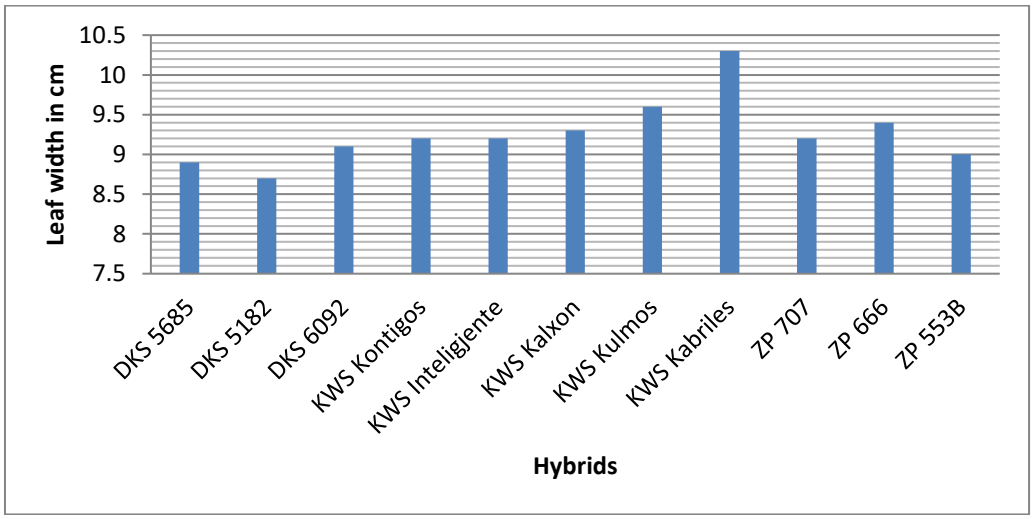


Chart No. 7 Width of the leaf in cm

Leaf width represents an indicator with small differences between hybrids, excluding only the KWS, Kabriles, and Kulmos hybrids, which have wider leaves with a narrower angle.

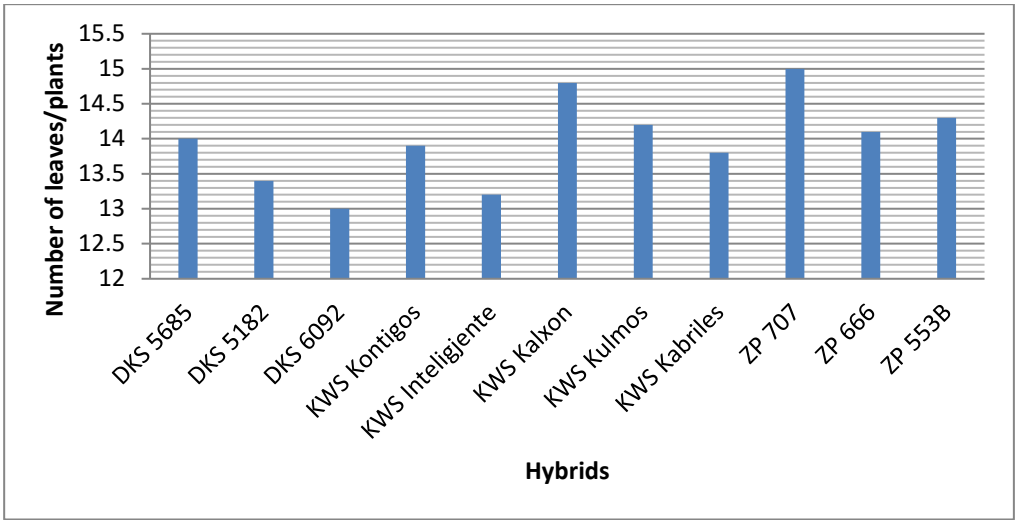


Chart No. 8 Number of leaves per plant

The number of leaves per plant varies both between hybrid groups and within the same group. Specifically, the hybrids KWS, Kalxon, and ZP 707 have the highest number of leaves, and DKS 5182, DKS 6092, and KWS Intelligent have the lowest number of leaves.

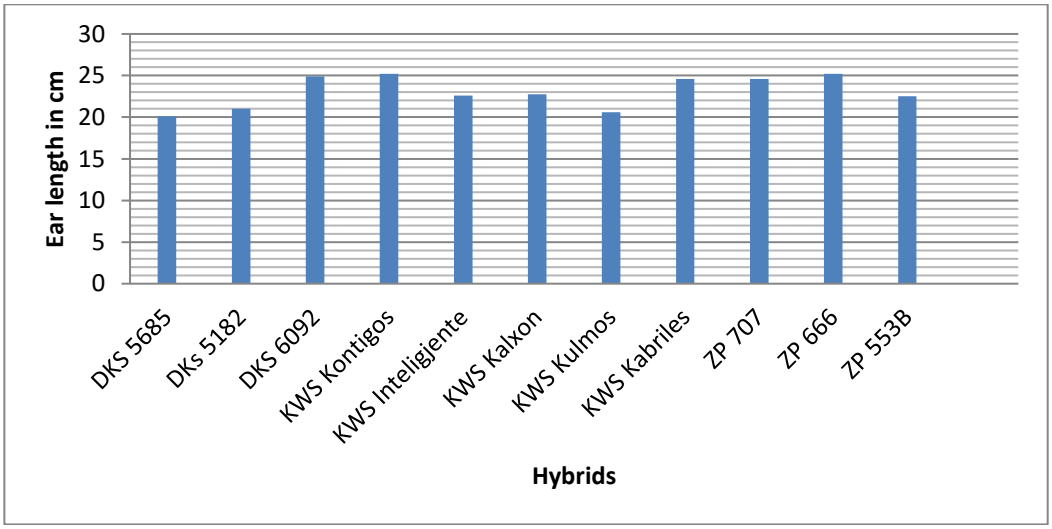


Chart No. 9 Ear length in cm

The length of the ear is an important indicator for achieving high yields. It does not show major changes. The highest values are in hybrids with a longer growing season, specifically: DKS 6092. KWS Kontigos, KWS Kabriles, ZP 707, and ZP 666, and the lowest values are in DKS 5685 and DKS 5182.

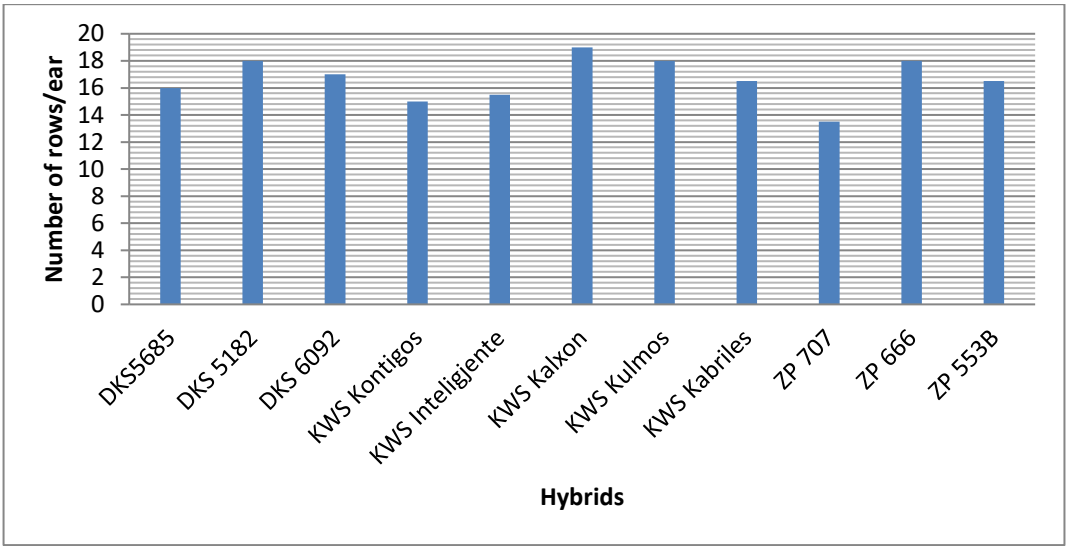


Chart No. 10 Number of rows per ear

The number of rows is approximate within the hybrid group, with values of 16-18 rows for DKS and KWS hybrids, while ZP hybrids go down to 14 rows.

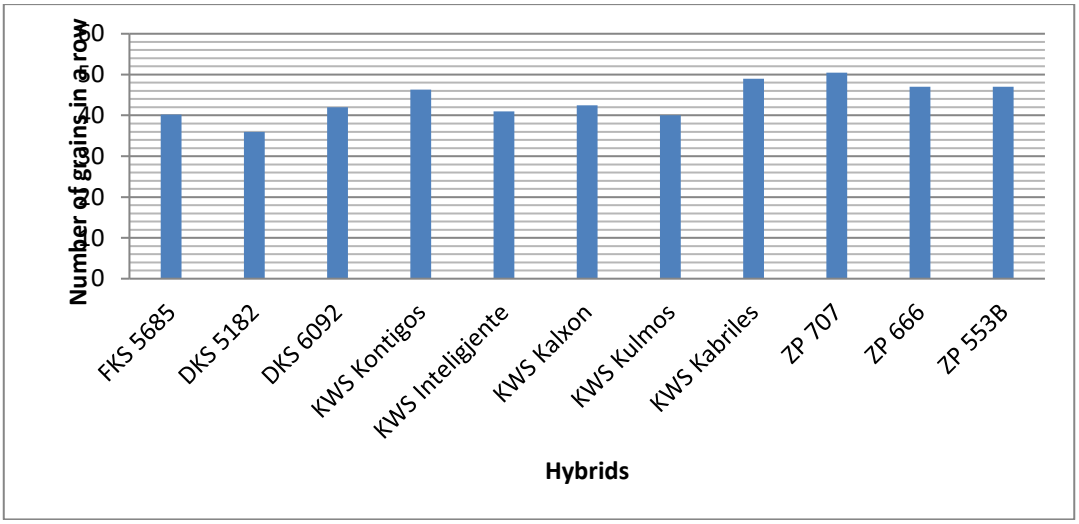


Chart No.11 Number of grains in a row

The number of grains per row is a genetically predetermined indicator. Failure to achieve the appropriate number of grains per row indicates a lack of quality service to maize hybrids. The highest number of grains is in the hybrids: KWS Kabriles, ZP 707, ZP 666, and ZP 538B, and the lowest number is in the hybrids: DKS 5685 and DKS 5182.

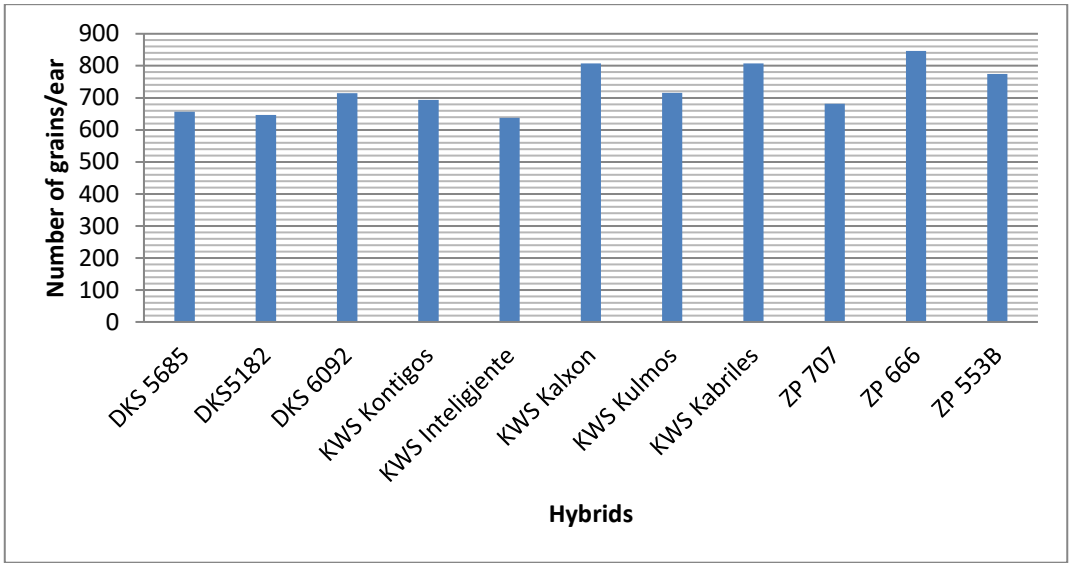


Chart No. 12 Number of grains per ear

The number of grains per ear is also genetically predetermined, but changes come from adaptation to climatic conditions and cultivation technology.

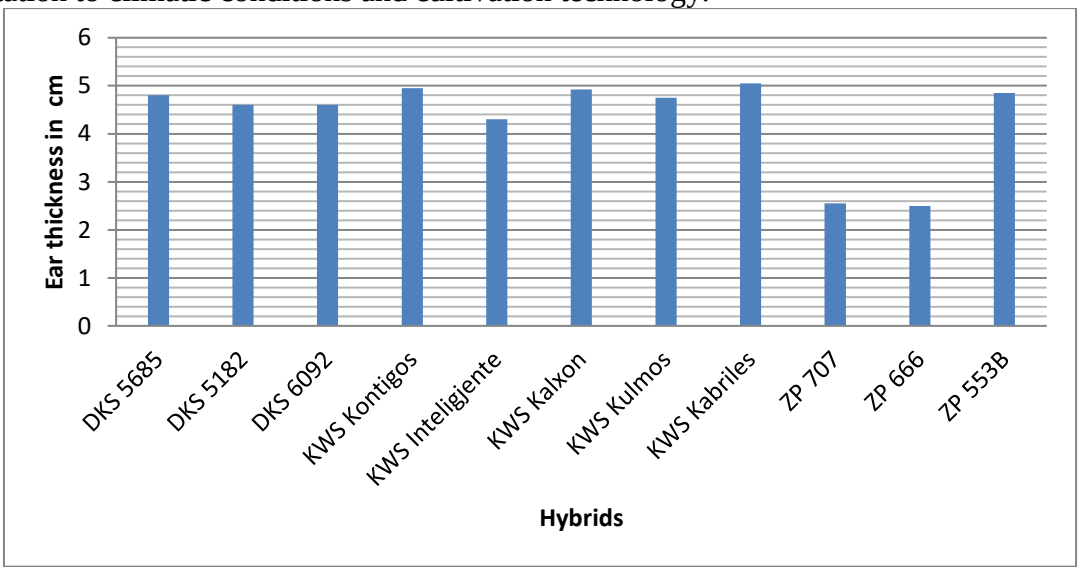


Chart No.13 Ear thickness in cm

The thickness of the ear is almost the same, with the only difference being the hybrids: ZP 707 and ZP 666, which have a smaller thickness.

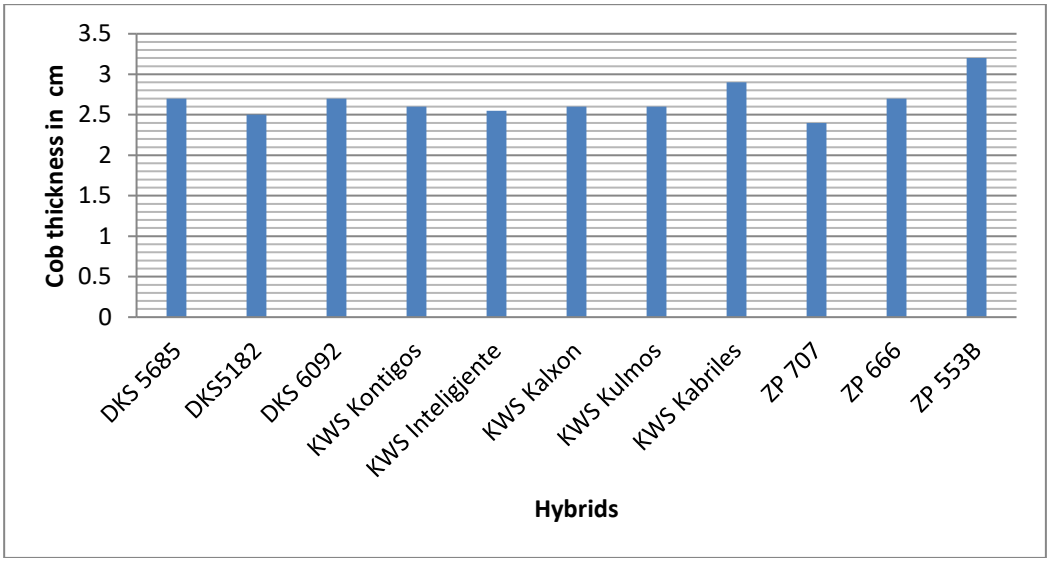


Chart No. 14 Cob thickness in cm

Cob thickness is almost equal in nine hybrids and is higher in two hybrids: KWS Kabriles and ZP 553B.

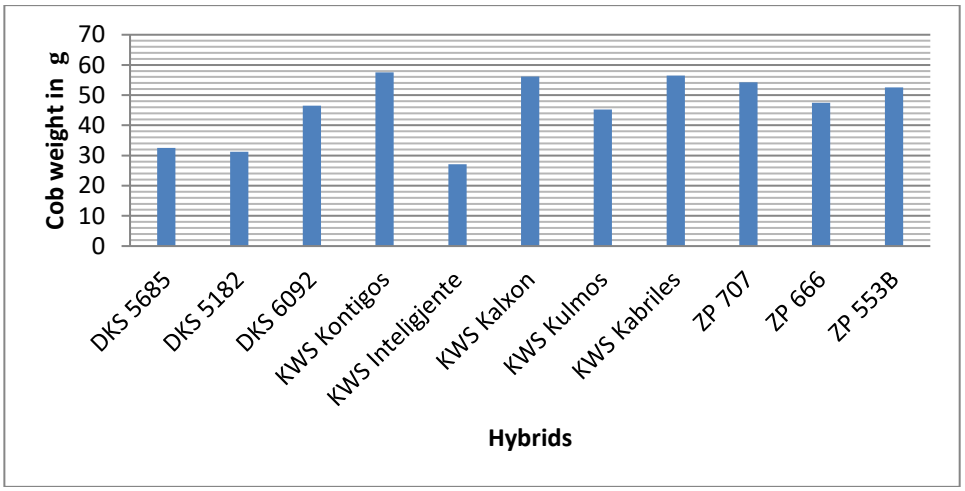


Chart No. 15 Cob weight in g

The weight of the cob is quite different both within the hybrid group and between the hybrid groups. The highest value is in the hybrids: KWS Contigos, KWS Kalxon, KWS Kabriles, ZP 707, and ZP 553B, and the lowest value is in DKS 5685, DKS 5182, and KWS Inteligent**.**

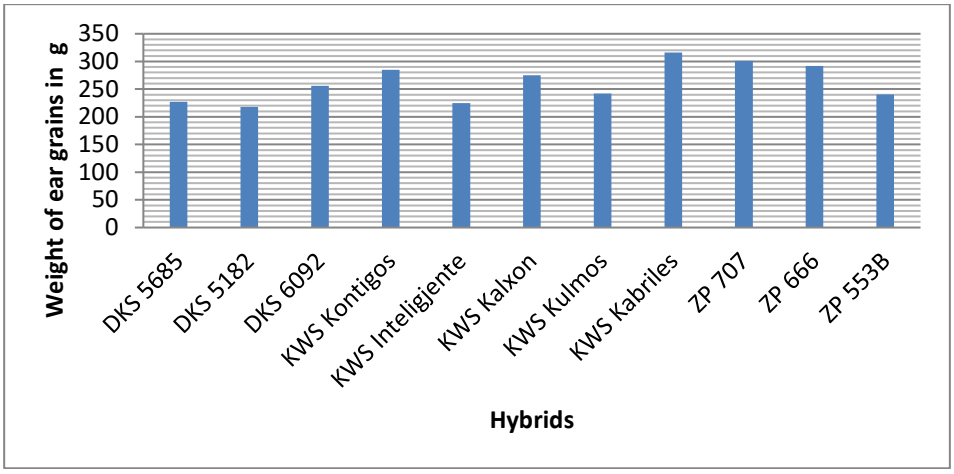


Chart No. 16 Weight of ear grains in g

The weight of the ear grain is also a genetically predetermined indicator. The differentiation is made by the quality of the cultivation technology. It presents differences between the group of hybrids and Kabriles, ZP 707, ZP 666, KWS Kontigos, and KWS Kalxon.

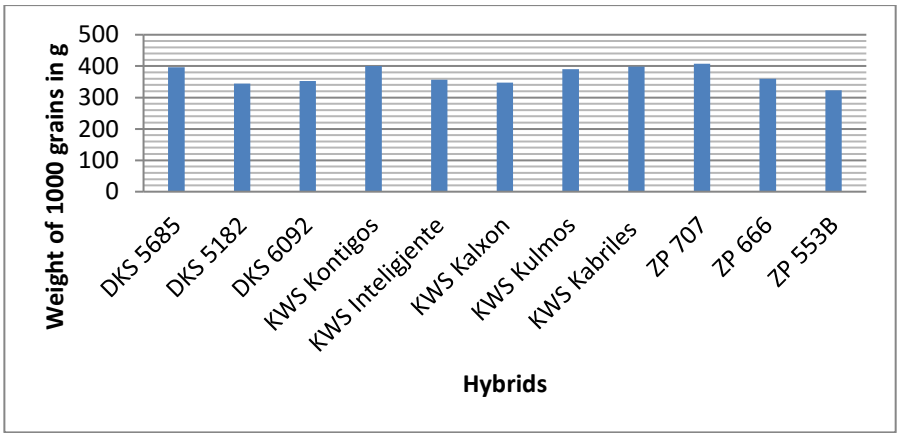


Chart No. 17 Weight of 1000 grains in g

The 1000-grain weight was done accurately because it represents a very important indicator for achieving high yields. The highest 1000-grain weight values were obtained from the following hybrids: DKS 5685, KWS Kontigos, KWS Kulmos, KWS Kabriles, and ZP 707.

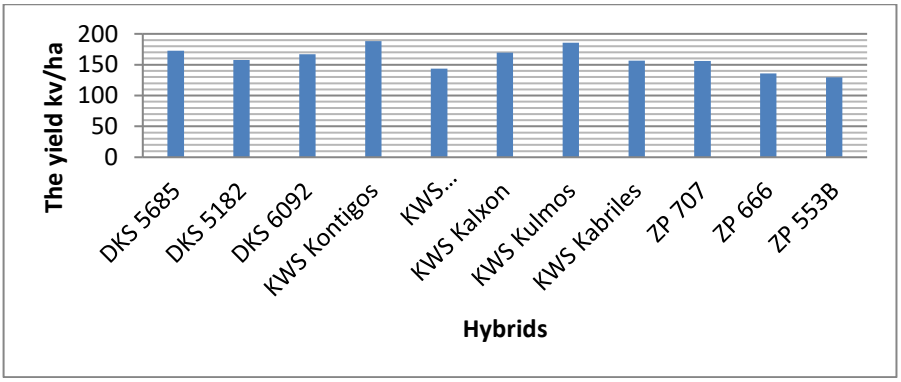


Chart No. 18 Yield kv/ha

Yield is the most important and final analytical indicator. Hybrids show differences among themselves. The highest yield was given by the KWS Kontigos hybrid, followed by the DKS 5685, KWS Kulmos, and ZP 707 hybrids.

4. Conclusions and recommendations

The study of some of the above-mentioned hybrids of various maize companies in the conditions of Saranda leads us to these conclusions and recommendations:

1. The hybrids included in this study are of different origins: Germany, Bulgaria, and Serbia (ZP). As can be seen from the graph, the height of the plant is
different. The highest height is achieved by the hybrids of KWS Germany and ZP Serbia. The hybrids differ greatly in plant height. The highest height is achieved by the Kontigos and Kabriles hybrids, both from KWS.
2. The height of the ear emergence does not show significant differences. The ear emerges higher, above 100 cm in the hybrids ZP 538, ZP 707, Kalxon, and Kulmos, and lower, below 100 cm in DKS 6092 and KWS Inteligente
3. Leaf length shows significant differences between the groups of hybrids according to their origin. The KWS Kontigos and ZP 707 hybrids have longer leaves, and the DKS 6092 and KWS Inteligente hybrids have shorter leaves, while the ZP hybrids have more complete stability.
4. Leaf width represents an indicator with small differences between hybrids, excluding only the KWS, Kabriles, and Kulmos hybrids, which have wider leaves with a narrower angle
5. The number of leaves per plant varies between hybrid groups and within the same group. Specifically, the hybrids KWS Kalxon and ZP 707 have the highest number of leaves, and DKS 5182, DKS 6092, and KWS Inteligente have the lowest number of leaves.
6. The length of the ear is an important indicator for achieving high yields. It does not show major changes. The highest values are in the hybrids with the longest growing period, and specifically DKS 6092. KWS Kontigos, KS Kabrilës, ZP 707 and ZP 666, and the lowest values are in DKS 5685 and DKS 5182.
7. The number of rows is approximate within the hybrid group, with values of 16-18 rows for DKS and KWS hybrids, while ZP hybrids go down to 14 rows.
8The number of grains per row is a genetically predetermined indicator. Failure to achieve the appropriate number of grains per row clearly indicates a lack of quality service to maize hybrids. The highest number of grains is in the hybrids: KWS Kabriles, ZP 707, ZP 666, and ZP 553B and the lowest is in the hybrids: DKS 5685 and DKS 5182.
9. The number of grains per ear is also genetically predetermined, but changes come from adaptation to climatic conditions and cultivation technology.
10. The number of grains per ear is also genetically predetermined, but changes come from adaptation to climatic conditions and cultivation technology.
11. Yield is the most important and final analytical indicator. Hybrids show differences among themselves. The highest yield was given by the KWS Kontigos hybrid, followed by the DKS 5685, KWS Kulmos, and ZP 707 hybrids.

From the overall assessment of all indicators and especially yield, we recommend planting the following hybrids in large-scale production: KWS Kontigos, DKS 5685, KWS Kulmos, and ZP 707, which have given the highest yield.

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