BEHAVIOUR OF MAIZE HYBRIDS IN SOIL AND CLIMATE CONDITIONS FROM SCDA LOVRIN IN 2015

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Abstract: *This study aimed at testing four maize hybrids for grains, Severo (FAO270), Kinemas (FAO350): Kornelius (FAO400) and KWS 3381 (FAO450), planted over two consecutive periods with a view to certifying the issue regarding their behaviour under the climate of Banat, SCDA Lovrin area, and to determining their production capacity. The bi-factorial experiment was placed in the experimental field according to the subdivided lots method. The experimental field stretches across 768,4 m^2, with the distribution of the four hybrids in six rows of 8m each, three repetitions. The area cultivated with a hybrid is of 33,6 m^2. They were planted at a depth of 6-7cm. The density was established at 62000-65000 harvested plants per hectare, and the distance between the rows was 70cm. The fertilization was done with 20:20:0 complex fertilizer, while weeds were fought with chemical products by pre-emerging weed control with Adengo – 0.4l dosage, and post-emerging with Mustang – 0,5l/ha dosage and Gat Motion – 1,5l/ha dosage. During the vegetation period several observations in different phenological stages were made: emergence, flowering, silk, maturation, and their correlation with the climatic and soil conditions. Planting hybrids in the third decade of April ensures a temperature of over 10°C and the necessary humidity for germination hasn't led to bigger grain productions (STAS 11380 kg/ha) compared to their planting in the first decade of May (11468kg/ha) because of the temperature conditions from the flowering/silk period. These hybrids show a good tolerance to draught and heat. The grain productions were: 8930kg/ha in R2/season I, Kinemas 10651kg/ha in R1/season I, Kornelius 10855kg/ha in R1/season I, and the most productive was KWS 3381 with 11468kg/ha in R2/season II. When harvested, the average humidity of the grains was at 15,8-21,5%.*

INTRODUCTION

The production capacity is a priority objective, with the biggest contribution to the economic efficiency of the maize crops. Most of the features of the maize ideotype related to the germinative energy, growth and development of plants, the expression of the production components and the tolerance to the unfavourable climatic, biotic and technologic factors contribute to the increase of the production capacity. (155)

Under the condition of a higher planting density, the following are imposed: plant force, flowering coincidence, capacity to form at least one well-developped, fully covered in grains corncob, healthy plant, green when mature, resilient to fall and breaking. (174)

Technological factors play a special role in obtaining higher production rates with superior indicators. Thus, a good water supply, the ensurance of nutritional elements in different growth and development stages provide the optimal conditions in the process of biosynthesis of protein substances.

Due to the increse in the production level, in the absence of fertilisers and nitrogen, there are decreases in the protein content of the maize kernel. The phenomenon is explained by

the increase in the production level without being supported by the crop's growth and development.

Early hybrids have smaller corncob and grains. The plants of these hybrids have a reduced leaf area. These features make early hybrids tolerant to bigger densities so that the lower weight of the corncob and grains could be compensated, to a large extent, by the bigger number of corncobs on the area. (114)

MATERIALS AND METHODS

The research method used in this study

The bi-factorial experiment was located in the experimental field according to the subdivided lot method. The planting density was established at 62000-65000 harvested plants per hectare with the following factor grades:

- **Factor A – planting season**

A_1 – season I - 24 - 25 April
A_2 – season II - 01 – 2 May

- **Factor B – cultivated maize hybrid**
  - **Simple hybrids**

B_1 = Kinemas

B_2 = Kornelius

  - **Trilinear hybrids**

B_3 = KWS 3381
B_4 = Severo

The research was performed in two stages: phenological observations in the field and lab analysis.

Statistical methods used in calculating and interpreting experimental data

For data processing and interpreting – 2 seasons x 4 maize hybrids - we used:

- dispersion analysis (analysis of variance),
- regression and correlation analysis,
- cluster analysis

Modern statistical methods, based on the theory of probabilities are irreplaceable in technique and biology, in economy and sociology, in medicine and agriculture, in psychology and education, in industry and state administration. With all this variety of applicable fields, the big majority of statistical methods are the same, only the application method being different. (Andrei t., Stacu S., 1995)

The biological material under study

During the experiment, we used maize KWS hybrids from different maturity groups with the following characteristics:

1. SEVERO – is a trilinear hybrid, group FAO 270/vegetation period 97-102 days. It is a hybrid recommended both for the grain production and for silage, it is high-waisted, with

medium-high corncob insertion, the corncob is long and cone-shaped, with white stalk, but corncobs with red stalk can also occur.

2. KINEMAS – is a simple hybrid, group FAO 350/vegetation period 109-114 days. It is a hybrid recommended for the grain production, it is high-waisted, with medium-high corncob insertion and rich foliage, the corncob is medium-long, with medium-high thickness and cone-shaped. The grains are yellow, de tip dentat?.

3. KORNELIUS – is a simple hybrid, group FAO 400/vegetation period 121-126 days. It is a hybrid recommended both for the grain production and for silage. It is high-waisted, with the high corncob insertion and long cone-shaped corncob, with red stalk.

4. KWS 3381 – is a trilinear hybrid, group FAO 450/vegetation period 130-134 days. It is recommended for the grain production, is medium-waisted, with medium corncob insertion, long thick cylinder-cone-shaped corncob, and red stalk. The grains are yellow, de tip dentat?.

Planting was done in the last decade of April (24-25 April) for the planting season I and the first days of May (1-2 May) for the planting season II.

RESULTS AND DISCUSSION

Under the soil and climate conditions of the experimental year 2015, there were significant production differences for the three cultivated hybrids: a production difference of 1176,5 kg/ha was obtained for the Kinemas hybrid, followed by the Kornelius hybrid with a production of 1352,5 kg/ha. The production results presented in table 1 confirm that the KWS hybrid had the biggest production difference of 2108,0 kg/ha, compared to the hybrid-witness Severo.

Table 1.

The influence of hybrids on the maize production in the experimental field from SCDA Lovrin in 2015

Cultivated hybrid	**Obtained productions**		**Difference kg**	**Significance**
	Kg/ha	**%**		
SEVERO	**8844,5**	**100,0**	**mt**	
KINEMAS	10021	113,3	1176,5	***
KORNELIUS	10197	115,3	1352,5	***
KWS 3381	10952,5	123,8	2108,0	***

DL 5% = 201,46 kg DL 1% = 282,46 DL 0,1% = 399,23

All hybrids had very significant production rates compared to the **hybrid-witness SEVERO**.

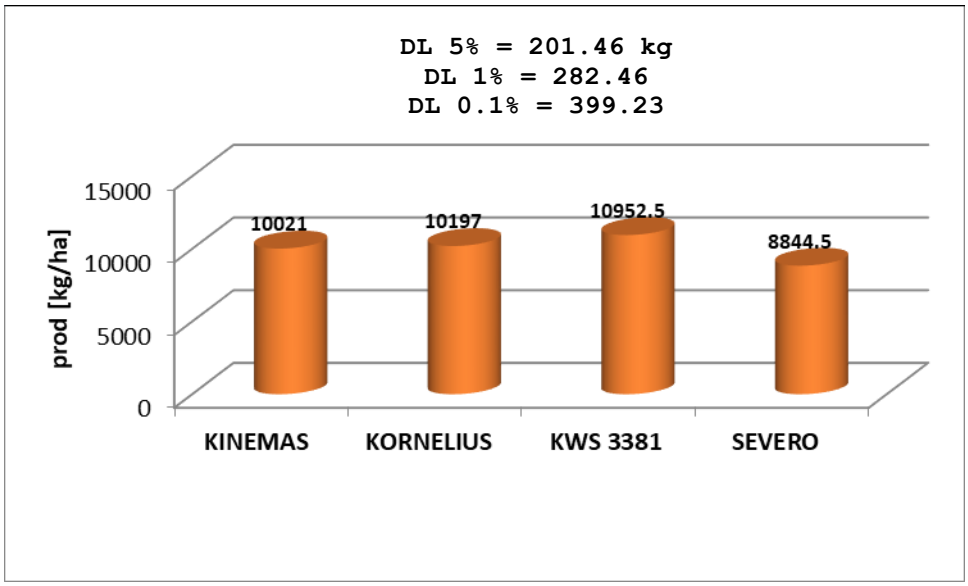

Fig.1. Results of the maize grains production (kg/ha) under the influence of hybrids in the experimental year 2015 at SCDA Lovrin

In the experimental year 2015, planting the maize in the first season determined a production difference of 563,0 kg/ha, compared to planting the maize in the second season, data presented in table 2.

Table 2.

The influence of the planting season on the maize production obtained at SCDA Lovrin under the conditions of the experimentalyear 2015

Factor A –planting season	**Productions**		**Difference kg/ha**	**Significance**
	Kg/ha	**%**		
Season I	10285,3	105,8	563,0	**
Season II	**9722,3**	**94,5**	**mt**	

DL 5% = 144,14 kg DL 1% = 332,47 DL 0,1% = 1058,48

Higher production rates were obtained for the maize hybrids planted in the first season as compared to those planted in the second season, these production differences being significant.

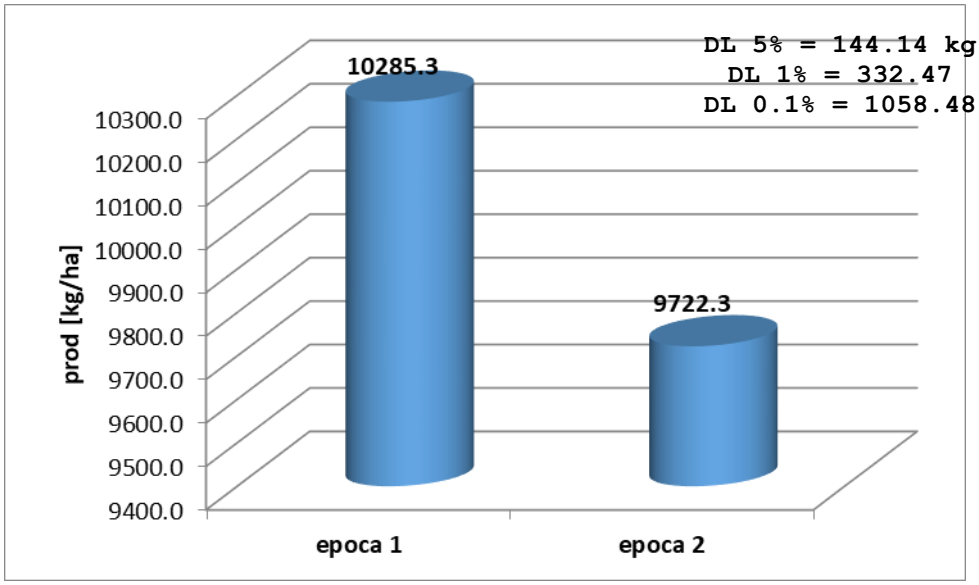

Fig.2. The variation of the maize production for the 4 hybrids according to the two planting seasons in 2015 at SCDA Lovrin

In 2015 the highest production rate (approximately 11400 kg/ha) is obtained for the KWS 3381 hybrid, planting season I, the rate obtained by this hybrid is significantly different from the hybrids Kornelius, KWS 3381, Severo planting seasons I and II. Similar production rates (approximately 9700 kg/ha) are obtained for the hybrids Kornelius and Kinemas, planting season II. The lowest production rate (approximately 8700-9000 kg/ha) is obtained for the hybrid-witness Severo, planting seasons I and II.

Table 3.

Synthesis of maize production results (kg/ha) obtained according to the two planting seasons in 2015 at SCDA Lovrin

Factor A-planting season/ Factor B - cultivated hybrid		Productions		Difference kg/ha	Significance
		Kg/ha	%		
Season I	**SEVERO**	**8699**	**100,0**	**mt**	
	KINEMAS	**10472**	120,4	1773	***
	KORNELIUS	10586	121,7	1887	***
	KWS 3381	11384	130,9	2685	***
Season II	**SEVERO**	**8990**	**100,0**	**mt**	
	KINEMAS	9570	106,5	580	***
	KORNELIUS	9808	109,1	818	***
	KWS 3381I	10521	117,0	1531	***

DL 5% = 284,91 kg DL 1% = 399,45 DL 0,1% = 564,60

Table 3 shows that, compared to the hybrid-witness SEVERO, all hybrids, at both planting seasons have very significant production rates, thus: the hybrid Kinemas had a production difference of 1773 kg/ha, the hybrid Kornelius 1887 kg/ha and the biggest production difference is the hybrid KWS with 2685 kg/ha.

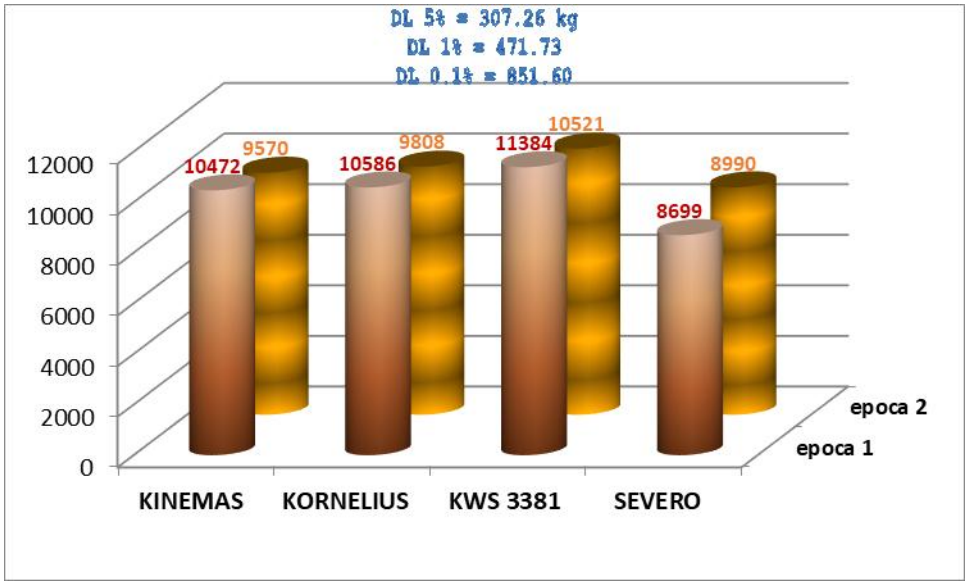

Fig.3. Synthesis of maize production results obtained according to the two planting seasons in 2015 at SCDA Lovrin

Figure 3 shows the synthesis of maize production results according to the two planting seasons in the experimental year 2015 obtained under the soil and climate conditions from SCDA Lovrin. We notice that only the hybrid Severo planted in the first season obtained a lower production rate than in the second season, the other three hybrids being above the average production rate of the hybrids planted at a later time.

CONCLUSIONS

In 2015, the best hybrid was KWS 3381 planting season I, Kornelius planting season I, KWS 3381 planting season II and Kinemas planting season I.

Under the soil and climate conditions from SCDA Lovrin, choosing the planting season induces significant production differences for the maize hybrids under study. Planting hybrids early withstands the low temperatures during germination, but they are more sensitive to the heat and drought during summer.

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