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BEHAVIOR OF CORN HYBRIDS CREATED AT S.C.D.A TURDA, UNDER THE CONDITIONS OF S.C.D.A. PITEȘTI-ALBOTA IN THE YEAR 2021

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Abstract
The promotion of new creations in the current stage ensures the confidence in obtaining both the larger productions and their quality. Lately, we are looking for new creations to respond with a greater adaptability to different environmental conditions. This is also the case with newly created hybrids at Turda resort, which were also tested in the conditions in the south of the country. In recent years, there has been a positive manifestation of the adaptability of these hybrids.
Of the 7 experienced hybrids, the Turda 335, Turda 165 and Turda 332 hybrids with average yields of over 6500 kg / ha stood out. The Turda 335 hybrid also had the highest absolute weight (MTG = 308). At the same time, the quality of the grains registered significant parameters. Thus, the Turda Star hybrid had the highest protein content (8.9%), the Turda 2020 hybrid had the highest oil content (4.5%) while most hybrids had the starch content between 72 % and 74%. In general, the hybrids demonstrated by the studied characters increased adaptability during the previous year.

Keywords: grain production, grain quality, TGW, Turda hybrids.

1. INTRODUCTION

Corn has been and will remain one of the most important crops due to its many uses (Osorno and Carena, 2008) being used as food for humans, animal feed and as a raw material for industry. Maize has also spread in cultivation due to its special phytotechnical and biological peculiarities (Fasoula and Fasoula, 2002; Haş et al., 2008) it is well resistant to drought and fall, it is attacked by relatively fewer diseases and pests, it can be grown on various lands, supports monoculture. At the same time, the plant is a weed, leaves the land free of weeds, is a good precursor for many plants, including winter wheat (both plants represent the share of cultivated areas in our country), makes very good use of organic and mineral fertilizers.
During the improvement periods, a special work was done in order to increase the yields per unit area (Haș et al., 2010). In the current stage, the new creations are characterized by a superior capitalization of the environmental conditions in different areas. They are manifested mainly by much higher yields or yields per hectare. Recently, special emphasis has been placed on improving quality indices (protein, starch, oil content).

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2. MATERIALS AND METHODS

This paper presents data obtained in 2021, in the pedoclimatic conditions of the resort, respectively in the High Plain of Pitesti. The soil in which the experimental field was located is of the stagnant albic luvosol type, with an acidic pH (5.3), a clayey structure (30% clay content), poorly supplied with nitrogen (Nt = 0.130%) and phosphorus (P = 33 mg / kg), moderately supplied with potassium (K = 89 mg / kg) and with a humus content in the arable horizon of about 2%.
7 hybrids from SCDA Turda were studied, which were cultivated in non-irrigated conditions. The cultivation technology was the one recommended by the resort.
The experimental method was that of the blocks, in 4 repetitions, in which the variants had 50 m² (5 × 10 m).
During the vegetation period of the maize, the main phenophases were noted, and in the final phase, determinations of grain production and their quality were made.
In the statistical calculations the analysis of variance was used (ANOVA test) and in the graphical representation of the figures the program Excel was used.
The quality analysis of the grains was performed with the help of the Infracmatic IM 9500 Plus analyzer.

3. RESULTS AND DISCUSSIONS

1. Characterization of climatic factors in maize vegetation.

For the first vegetation period, the temperature values were close to normal, even below them (figure 1). The sowing was carried out in these conditions on 26.04.2021. During May, the temperatures were very close to normal, which allowed a positive evolution of the first phenophases. Starting in mid-June and including August, the values exceeded the normal by 2-3°C, which hastened both the flowering and the deposition of nutrients in the grains. August had long periods of heat, which led to the forcing of the maturation of all hybrids in about the same period.
For sowing, the corn had a normal water supply, so it went through the sunrise and the first phenophases in good conditions (figure 2). Starting with May, the rainy season entered, which materialized in small excesses of precipitation very favorable for the intense growth of plants and flowering. The severe drought, which lasted from the beginning of July until maturity, continued. In September, when the ripening of the harvest took place, the rains were almost completely absent.

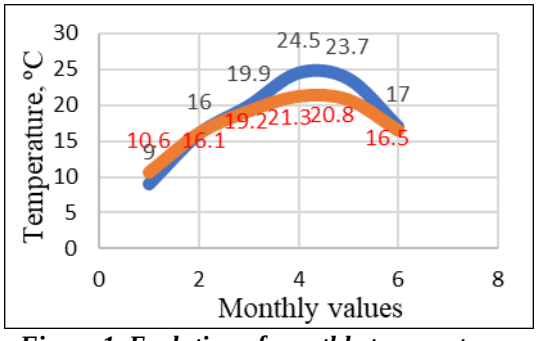

Figure 1. Evolution of monthly temperatures

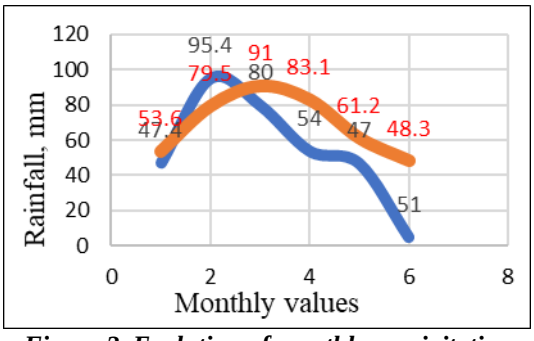

Figure 2. Evolution of monthly precipitation

2. Grain production and quality

At harvest, the grain production in STAS values, the momentary humidity, the mass of one thousand grains and the sum of the temperature degrees were determined for the whole experiment.

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The average grain production ranged from 4887 kg/ha (Turda Star hybrid) to 6562 kg/ha (Turda 335 hybrid). The control hybrid Turda 165 had an average grain production of 6551 kg/ha. From a statistical point of view, there were no significant differences between the 7 hybrids studied. One of the causes was a very long period of drought during the formation and maturation of the grains (table 1).

The absolute weight of the grains (MTG) had important and characteristic oscillations for each hybrid. In absolute values, these were between 200 g for the Turda 248 hybrid and 308 g for the Turda 335 hybrid. Statistically, the same Turda 335 hybrid had the MTG with a significantly differentiated value from the control.

Due to the fact that the grains of all hybrids had a uniform maturation, the sum of the degrees of active temperatures stood at 1477°C.

Table 1. Evolution of grain production (15%) and MTG in cultivated hybrids

Nr. Crt.	**Hybrids TURDA**	**Production**		**MTG g**	**∑t°≥10**
		kg/ha	**%**		
1	TURDA 165	6551	100-Mt	226	1477
2	TURDA STAR	4887	74.6	270	
3	TURDA 332	6551	100	270	
4	TURDA 334	6437	98.2	234	
5	TURDA 335	6562	100.1	**308**	
6	TURDA 2020	6129	94.0	236	
7	TURDA 248	6129	93.5	200	
DL5% DL1% DL0.1%		887.7 1216.0 1657.2	13.5 18.5 25.3	29.4 40.3 55.0	

Cultivated hybrids were determined as follows: protein content, oil content, starch content and grain moisture. Given that the whole set of cultivated hybrids had a humidity of less than 20% at harvest, it again demonstrates a relative uniformity at maturity.

Table 2. Evolution of grain quality according to hybrid

Nr. Crt.	**Hybrids TURDA**	**Protein %**	**Oil %**	**Starch %**	**U%**
1	TURDA 165-Mt	7.9	4.2	71.9	14.3
2	TURDA STAR	**8.9**	4.3	71.4	15.3
3	TURDA 332	7.4	3.9	**73.4**	19.0
4	TURDA 334	6.7	4.3	**73.0**	17.2
5	TURDA 335	6.9	3.6	**73.4**	15.5
6	TURDA 2020	7.3	**4.5**	**72.6**	16.9
7	TURDA 248	6.9	4.1	**73.0**	17.7
DL5% DL1% DL0.1%		0.3 0.4 0.6	0.2 0.3 0.5	0.5 0.7 0.10	0.7 0.9 1.3

The data in table 2 show that the protein was between 6.7% (T. 334) and 8.9% (T. Star). From a statistical point of view, the highest crude protein content was the Turda Star hybrid, at a very significant level. Witness Turda 165 contained 7.9% protein in grains. In terms of grain oil content,

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it was between 3.6% (T. 335) and 4.5% (T. 2020). The level of significance of the oil content in the Turda 2020 hybrid was distinctly significant. Regarding the starch content, the variation limits were between 71.4% (Turda Star) and 73.4% (T. 332 and T. 335). The levels of starch content in maize grains showed significant values compared to control Turda 165. The water in the grains was between 14.3% in the case of control Turda 165 and 19% in Turda 332. There were no differences between the values of this parameter significantly.

3. Analysis of the correlations obtained between the studied characters.

Between all the analyzed characters, a series of correlations were obtained with a pronounced specificity character. Thus, the correlation between grain production and their protein content was clearly negative. The correlation coefficient in this case was -0.761. The expression of this correlation may be due to the fact that some hybrids with a slightly lower production have shown higher protein contents (figure 3).

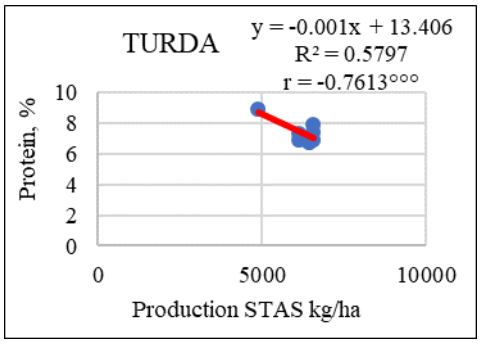

Figure 3. Correlation between grain yield and protein

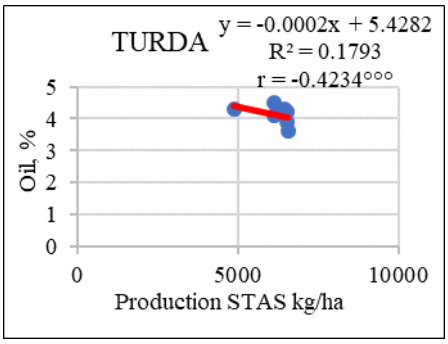

Figure 4. Correlation between grain yield and oil

The correlation between grain production and their oil content is also very significant negative, but at a much lower value (-0.423). The scatter of the values in the graph was relatively higher due to the specificity of each cultivated hybrid (figure 4).

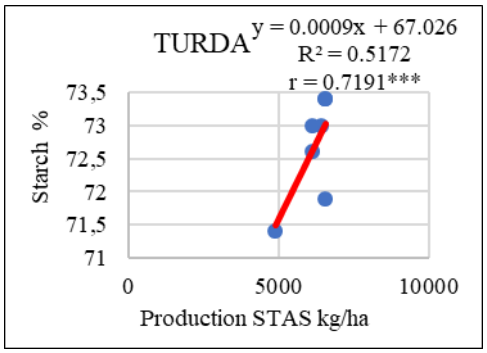

Figure 5. Correlation between grain yield and starch

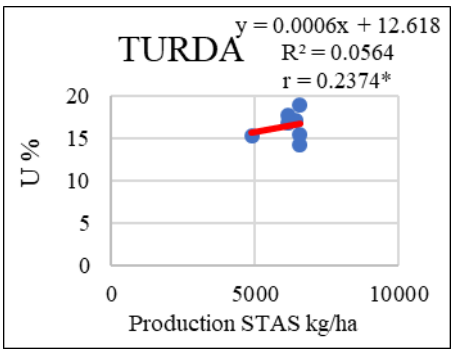

Figure 6. Correlation between grain yield and moisture

In the case of correlations between grain production and their starch content, a very significant positive correlation was obtained (r = 0.719). From the obtained data it was found that due to the weather conditions in the crop year, the deposition of starch in grains in all these hybrids was favored (figure 5).

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In the case of the correlation between grain production and their moisture at harvest, a positive and significant correlation was obtained (r = 0.237). One explanation is that the dry bottom has contributed to a relatively uniform water content of the grains, but also that later forms (which usually have higher yields) have managed to maintain a relatively higher water concentration (figure 6).

The literature shows that there is an antagonism between the grain content in the oil and the starch content, due to several causes. In the present correlation this phenomenon was confirmed by a very significant negative correlation coefficient (r = -0.589). The analysis of the values clearly showed that at an oil content of 4.1% - 4.2%, starch accumulated in the proportion of 71% -72%. In contrast, between hybrids with an oil content of less than 4%, starch between 73% and 74% accumulated (figure 7).

The correlation obtained between the grain content in the oil and the moisture content was close to 0 or negative, without significance. Usually there is no correlation between the two elements, namely the oil content and the water content of the grains, or the values at which it is expressed are very low (figure 8).

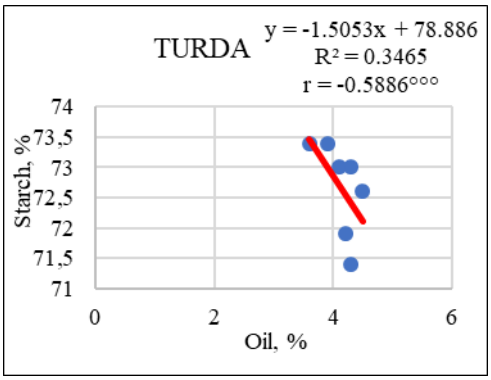

Figure 7. Correlation between the oil and starch

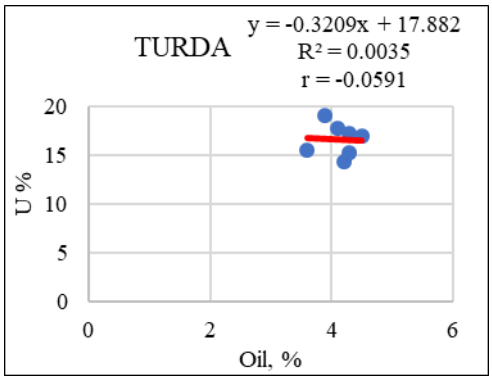

Figure 8. Correlation between oil and grain moisture

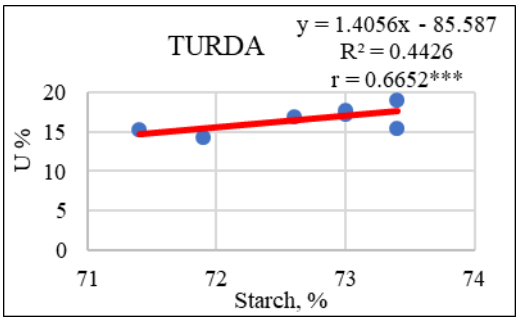

Figure 9. Correlation between starch and moisture

Figure 10. Appearance of corn cobs

Finally, the relationship between starch and grain moisture had a slightly increasing trend, with values very close to the regression stage (r = 0.665). One of the causes is that in the case of relatively later hybrids, at a slightly higher humidity of the grains at harvest, they accumulated a little more starch (figure 9). The appearance of the cobs of some experienced hybrids is shown in figure 10.

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Given all the correlations obtained between the characteristics of the experienced maize hybrids, there is a very obvious link between them, either with positive and therefore increasing trends or very significant negative and therefore decreasing (table 3).

Table 3. Correlations between grain production and quality indices

	Production	Protein	Oil	Starch	U %
Production	1	**-0.761**	**-0.423**	**0.719**	**0.237**
Protein		1	**0.303**	**-0.871**	**-0.230**
Oil			1	**-0.589**	-0.059
Starch				1	**0.665**
U%					1
DL 5%= 0.19		DL 1%= 0.25			DL 0.1%= 0.32

4. CONCLUSIONS

In 2021, as in previous years, Turda hybrids have shown good to very good adaptability. Under the conditions of the resort the favorable elements in the case of hybrids created at S.C.D.A. Turda benefits from periods of high rainfall and even an increase in air humidity in the post-flowering period.

The valorization of the genetic potential of the new hybrids is also ensured by the average fertilization levels established for this crop. However, an important contribution is the observance of the optimal sowing period, weed control, etc.

Production levels have been at the level of climatic conditions since 2021, production is not very high but there have been some differences in quality, which means that some of these hybrids are adapting to produce more starch. In the conditions in which between 5t/ha and 7t/ha were obtained, the quality of the grains was the following: the crude protein was between 6.7% and 8.9%; the oil was between 3.6% and 4.5% and the starch between 71.4% and 73.4%.

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