BEHAVIOR OF SOME WINTER WHEAT VARIETIES AND PERSPECTIVE LINES AT A.R.D.S LOVRIN

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Abstract

The present paper aims to analyze the behavior of twenty-five Romanian wheat varieties and perspective lines, in the process of homologation, in terms of the yields of the grains obtained in the agricultural year 2016-2017 at SCDA Lovrin.The climatic year 2016-2017 was an excellent year due to the fact that sowing was done late in autumn, and emergence of the plants occurred in the spring, which determined the specific reactions of the wheat varieties, expressed in the productions as well as in morphological characters.Variance analysis revealed differences between the twenty-five varieties studied, with climatic conditions in this period having significant effects on the behavior of studied wheat varieties.The average production of the studied genotypes ranged between 7917 kg/ha at the Viteaz prospecting wheat variety, and 4958 kg/ha 11424G-1 the winter wheat prospecting variety, and the coefficient of variation had the lowest values for perspective winter wheat Pitar, Pajura, Signal and 11424G-1.

Key words: winter wheat, yield, variance analysis

In order to achieve high, stable and superior quality wheat production, it requires the cultivation of many valuable genotypes, with high production capacity, with differentiated superior qualities, resistant to disease and adapted to different environmental conditions.

In formimg the crop and its quality, the influence of climatic conditions is of particular importance. The interactions between genotype and environment in the breeding process oblige to the creation of varieties with adaptability to favorable and unfavorable climatic conditions (Popescu et al., 1997; Negru, 2009).

In addition to high production capacity and high quality crop, resistance to stress factors that determine production fluctuations are important concerns for breeders. Adaptability of varieties, respectively production stability, which is a cumulation of resistance to stress factors, is a major objective of improving winter wheat.

Due to environmental factors, very different from one year to the next, but also to the characters and attributes of the variety, the interactions between the genotype and the environment prove to be complex.

The stability of cereal production varies widely due to the different cultivation conditions (Leistrumaite and Paplauskiene, 2005), being a complex character influenced by many agronomic attributes.

The stability of the production is given by the sum of the resistance of the variety to the unfavorable conditions of the biotic and abiotic environment (Săulescu et al., 1995; Bănățeanu, 2002; Bunta, 2002; Gașpar et al., 2002) and by the interaction of offset characters (Timariu, 1975).

The breeding work should aim at the selection of genotypes with a high twinning capacity to produce high yields, year after year, and this character to be correlated with a medium number of grains in the spice and a good filling thereof, under all conditions culture, also a good resistance to falling.

MATHERIAL AND METHOD

The present paper aims to analyze the behavior of twenty-five Romanian wheat varieties and prospective lines under homologation (Glosa Boema 1, Litera, Miranda FDL, Izvor, Otilia, Pitar, Pajura, Semnal, Ursita, Unitar, 11424G-1, Vestitor, Viteaz, Voevod I, Voevod II, A4-10, Adelina, S119, Alex, Lovrin6112/16, Lovrin1113/16, Lovrin6109/16, Lovrin 110/16, Bezostaia 1) at ARDS Lovrin, on the basis of a comparative crop test based on the six balanced square grid method, with 5 sqm harvestable plot.

The experimental plot soil was cambic chernozem, poorly gleissed, rich in humus (3.47) and with a normal content in total nitrogen (0.171-0.120 mg N / 100 g soil), low in phosphorus (0.4-0.6 mg P2O5 / 100g soil) and mediocre in potassium (9.00-17.5 mg K2O / 100 g soil).

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The statistical processing of the production results was made by variance analysis, the F test and the limit differences, (Săulescu şi Săulescu, 1967; Ceapoiu) The variance analysis revealed differences between the twenty five varieties studied, the climatic conditions of this period having significant effects on the behavior of studied wheat varieties. Multiple comparisons were made (DUNCAN test) whitch resulted in classes A - I. Comparisons were made at probability level α = 5%.

The agricultural year 2016/2017 can be considered a difficult year in terms of climate, especially for autumn sown crops. Thus, in the Banat plain area, in October 2016, which coincides with the optimal sowing period of wheat, a total rainfall of 112 mm was recorded, respectively three times more than the multiannual average (39.5 mm). Under these circumstances, the sowing period of the wheat was postponed until November and the emergence of the plants was carried out in the spring, which determined the specific reactions of the wheat varieties, expressed in the productions obtained, as well as in the morphological characters.

Table 1

The sum of monthly average precipitations in Lovrin from 2016 to 2017

Month	IX	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	Annual sum
Monthly average	48	112	37	3	20	25	30	54	29	40	30	22.5	450.5
Multiannual monthly average	42.6	39.5	48.4	40.7	32.2	29.5	32.8	42.7	56.8	67.8	55.8	32.5	521.3
Deviation	5.4	72.5	-11.4	-37.7	-12.2	-4.5	-7.2	11.03	-27.8	-27.8	-25.8	-10.0	-63.27

The precipitations recorded at Lovrin in the agricultural year 2016-2017 totaled 450.5 mm, with a 70.8 mm deficit versus the multiannual average. In September and October there was a surplus of rainfall.

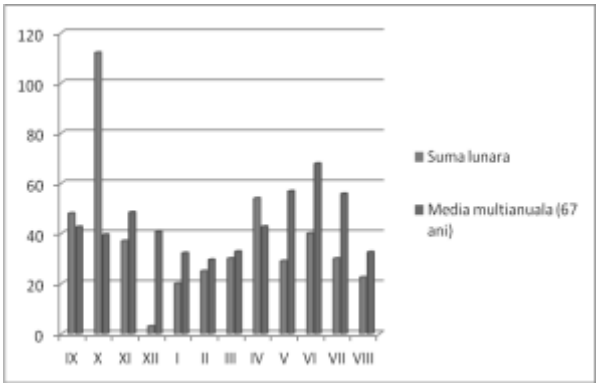

Fig. 1 **The sum of monthly average precipitations in Lovrin from 2016 to 2017**

The deviation from the multiannual average in the two months is 77.9 mm. This resulted in a delay in sowing, the first three variants of experience (Glosa, Boema 1 and Litera) were sown on November 2, then the sowing was interrupted by a large amount of precipitation which prevented us to enter the field, after which we resumed sowing on November 22, when the first emerged variants was noted, the other 23 variants of the wheat emerging in the spring.

High temperatures in the spring months (March recorded a deviation of 4°C from the multiannual average) allowed the early resuming of the vegetation period, explosive and uniform.

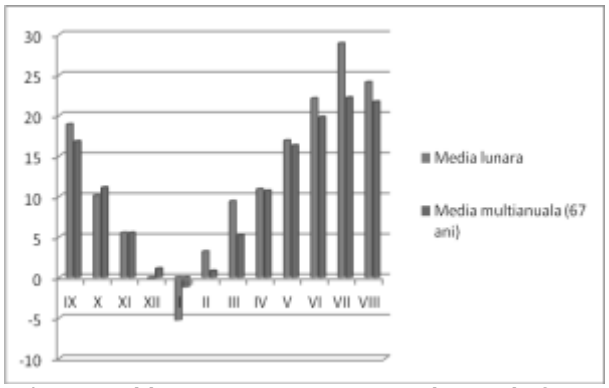

Fig.2 **Monthly average temperatures in Lovrin from 2016 to 2017**

Table 2

Monthly average temperatures in Lovrin from 2016 to 2017

Month	IX	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	Annual sum
Monthly average	18.9	10.1	5.5	-0.3	-5.3	3.2	9.4	10.9	16.9	22.1	28.9	24.1	144.4
Multiannual monthly average	16.8	11.1	5.5	1.1	-1.2	0.8	5.2	10.7	16.3	19.8	22.2	21.7	130
Deviation	2.1	1.0	0	-1.4	-4.1	2.4	4.2	0.2	0.3	2.3	6.7	2.4	16.1

RESULTS

In the experimental year 2016-2017, the production differences between the studied varieties were due to a significant extent both to the genetic potential of the varieties and to a significant influence of the environmental conditions.

Table 3

Grain yields obtained from the 25 wheat varieties and perspective lines at ARDS Lovrin

Nr.crt	Variant	Average production (kg/ha)	Relative production (%)	Difference ± (kg/ha)
1	Glosa	7292 abcde	100	0
2	Boema 1	7347 abcd	101	56
3	Litera	7139 abcdef	98	-153
4	Miranda FDL	6958 bcdefgh	95	-333
5	Izvor	7542 abc	103	250
6	Otilia	6972 bcdefg	96	-319
7	Pitar	6181 gh	85	-1111
8	Pajura	6125 h	84	-1167
9	Semnal	6389 fgh	88	-903
10	Ursita	7389 abcd	101	97
11	Unitar	6667 defgh	91	-625
12	11424G-1	4958 i	68	-2333
13	Vestitor	7069 bcdef	97	-222
14	Viteaz	7917 a	109	625
15	Voevod I	7694 ab	106	403
16	Voevod II	7125 abcdef	98	-167
17	A4-10	7250 abcde	99	-42
18	Adelina	6967 bcdefg	96	-325
19	S119	6792 cdefgh	93	-500
20	Alex	6500 efgh	89	-792
21	Lovrin 6112/16	6597 defgh	90	-694
22	Lovrin 1113/16	7056 bcdef	97	-236
23	Lovrin 6109/16	7708 ab	106	417
24	Lovrin 6110/16	7244 abcde	99	-47
25	Bezostaia 1	6778 cdefgh	93	-514

DL 5% = 839 kg;
DL 1% = 1108 kg;
DL 0.1% = 1429 kg

From the analysis of Table 3 we can state that in the agricultural year 2017, the largest production was made by the Viteaz prospective wheat line (7917 kg/ha), which exceeded the Glosa control variety by 9% and 625 kg/ha respectively, followed by the winter wheat line Lovrin 6109/16 (7708 kg/ha) and Voevod I (7125 kg/ha) which exceeded the control variety by 6.0%, the Izvor wheat variety (7542 kg/ha) by 3% and 250 kg/ha and the Ursita wheat line (7389 kg/ha) which exceeded the control variety by 1%. Less productions were reported, those with statistically significant negative differences on line 11424G-1 (-2333 Kg/ha ^{000}), Pajura (-1167 ^{00}), Pitar (-1111 ^{00}) and Signal (-903 ^{0}).

On the other varieties and winter wheat prospective lines the gains over the control variant [Glosa] are not statistically assured.

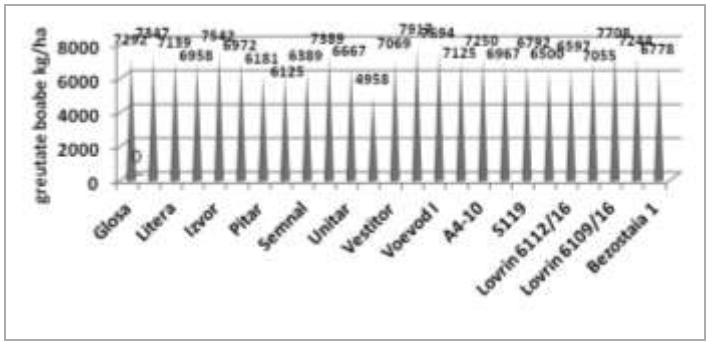

Fig.3. **Grain weight (kg / ha) obtained by the 25 studied variants (2017)**

From Figure 3 it can be noticed that the grain production of the studied 25 varieties and prospective lines of winter wheat, oscillated between 7917 kg/ha in the Viteaz prospective wheat variety and 4958 kg/ha of 11424G- 1 perspective wheat variety.

Compared to the Glosa control variety, the production increases in other varieties are not statistically assured.

Table 4

Variation analysis of grain production in the winter wheat varieties and perspectives lines studied during 2016-2017 at ARDS Lovrin

SURCE	GL	SP	VARIANCEn S^2	TEST F	
				VALUE	SEMNIFF.
REPETITION	5	6707805.420	1341561.084		
FACTOR A	24	54993397.240	2291391.552	4.2535	***
ERROR	120	64645021.080	538708.509		
TOTAL	149	126346223.740			

The variance analysis table for the wheat grain production (Table 4) indicates that there are very significant differences between the studied varieties due to the increased influence of the environmental conditions during the experimental period. According to the variation coefficient (10.6%), the production (grain weight) of the 25 variants in 2017 had a medium variation (Ceapoiu, 10% <cv <20%).

According to the F test, the factor A (variant) has a very significant action on the weight of the grains, there are very significant differences between the 25 variants studied.

According to the DUNCAN test (Table 5), 300 comparisons were made (C252=300), following comparisons resulted in grades A-I.

Comparisons were made at probability level $\alpha = 5\%$.

Variant 14 (Viteaz) - class A, had a gain significantly different from the following variants: v13, v22, v6, v18, v4, v19, v25, v11, v21, v20, v9, v7, v8 and v12.

Table 5

The DUNCAN Test for the Grain Production of the varieties and prospective lines of winter wheat studied between 2016-2017 at ARDS Lovrin

Original data				Screened data		
V1	Glosa	7292	ABCDE	V14	7917	A
V2	Boema 1	7347	ABCD	V23	7708	AB
V3	Litera	7139	ABCDEF	V15	7694	AB
V4	Miranda FDL	6958	BCDEFGH	V5	7542	ABC
V5	Izvor	7542	ABC	V10	7389	ABCD
V6	Otilia	6972	BCDEFG	V2	7347	ABCD
V7	Pitar	6181	GH	V1	7292	ABCDE
V8	Pajura	6125	H	V17	7250	ABCDE
V9	Semnal	6389	FGH	V24	7244	ABCDE
V10	Ursita	7389	ABCD	V3	7139	ABCDEF
V11	Unitar	6667	DEFGH	V16	7125	ABCDEF
V12	11424G-1	4958	I	V13	7069	BCDEF
V13	Vestitor	7069	BCDEF	V22	7055	BCDEF
V14	Viteaz	7917	A	V6	6972	BCDEFG
V15	Voevod I	7694	AB	V18	6967	BCDEFG
V16	Voevod II	7125	ABCDEF	V4	6958	BCDEFGH
V17	A4-10	7250	ABCDE	V19	6792	CDEFGH
V18	Adelina	6967	BCDEFG	V25	6778	CDEFGH
V19	S119	6792	CDEFGH	V11	6667	DEFGH
V20	Alex	6500	EFGH	V21	6597	DEFGH
V21	Lovrin 6112/16	6597	DEFGH	V20	6500	EFGH
V22	Lovrin 1113/16	7056	BCDEF	V9	6389	FGH
V23	Lovrin 6109/16	7708	AB	V7	6181	GH
V24	Lovrin 6110/16	7244	ABCDE	V8	6125	H
V25	Bezostaia 1	6778	CDEFGH	V12	4958	I

CONCLUSIONS

In the agricultural year 2016-2017, climatically exceptional, the sowing took place in autumn late November 22 and the emergence of the plants was made in the spring, which determined the specific reactions of the wheat varieties, expressed in the produced productions , as well as morphological characters.

The average production of genotypes studied varied between 7917 kg/ha in the prospective Wheat Prospect line and 4958 kg/ha at the autumn wheat prospect line 11424G-1, and the coefficient of variation had the lowest values for wheat varieties Autumn Pitar, Pajura, Signal and Perspective Wheat Prospect Line 11424G-1

Grain weights (production), according to the coefficient of variation in the 25 variants in 2017, had a mean variation (10.6%)

According to the F test, the factor A (variant) has a very significant action on the weight of the grains, there are very significant differences between the 25 variants studied

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