STUDIES CONCERNING SOME MILLING QUALITY TRAITS IN AUTUMN WHEAT (*T. AESTIVUM VULGARE*) UNDER THE INFLUENCE OF FERTILIZATION

STUDIUL UNOR ÎNSUŞIRI DE CALITATE PANIFICABILĂ LA GRÂUL DE TOAMNĂ (*T. AESTIVUM VULGARE*) SUB INFLUENŢA FERTILIZĂRII

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***Abstract**: The present paper aims at the assessment of optimal fertilization doses for autumn wheat (T. Aestivum vulgare) culture technology and testing of milling quality under the influence of different fertilizer doses used for the considered wheat varieties. Our researches allowed us to conclude that best wheat varieties in terms of milling quality proved to be Ciprian and Alex. The optimal nitrogen-based fertilization dose considering four different doses was of 100 kg/ha S.A.*

***Rezumat:** Lucrare de faţă a fost elaborat în vederea stabilirii dozelor optime de fertilizare în tehnologia de cultivare a grâului de toamnă şi testarea calităţii panificabile sub influenţa diferitelor doze de îngrăşăminte aplicate soiurilor de grâu luate în studiu. Din experiment rezultă că cele mai bune soiuri de grâu cu o calitate panificabilă ridicată au fost: Ciprian şi Alex. Din cele patru doze de fertilizare reiese că doza optimă de fertilizare cu azot este de **100** kg/ha S.A.*

***Key word**: wheat, varieties, fertilization, dose, quality*
***Cuvinte cheie**: grâu, soiuri, fertilizare, doze, calitate.*

INTRODUCTION

Wheat is considered one of the most important crops for human food. The effectiveness and commercial value of wheat crops are given by numerous factors such as: variety, fertilization, milling quality traits, etc. The introduction into cultivation of native and novel foreign wheat varieties demanded more scientific information with regard to ecological and quality traits.

MATERIAL AND METHOD

In the present paper, we have evaluated wheat yields in terms of quality considering the researches performed at S.D.E in the study year 2006. In order to test autumn wheat varieties in field conditions, we have organized field experiments involving two experimental factors:

A factor – Fertilization
- a1- N60 P60 K60
- a2 - N 80 P60 K60
- a3 - N100 P60 K60
- a4 - N140 P 60 K60
- a5 N60 P60 K60 + foliar fertilization in the skin bag phase.

B factor – variety with 7 graduations:
- b1- ALEX;
- b2- LV34;
- b3- CIPRIAN;

- b4-SERINA;
- b5-G.K. OTHALOM;
- b6-G.K. GOBE;
- b7-BAIKA.

The studied wheat varieties consisted of native and foreign varieties originating from Serbia and Hungary. The previously mentioned wheat varieties are cultivated on large areas in the West Field regions of Romania. The surface cultivated with each variety rises up to 51 sq. m; the overall surface which has been occupied by each variety within the experiment was of 306 sq. m; the harvestable surface of plot/ replication = 17 sq.m, the effective surface occupied by the experimental factors totalizing 2142 sq. m. The experiment maintenance imposed the following crop measures: chemical fertilization, using Nitrogen-based fertilizers in accordance with doses assessed for each experimental variant; weed control was performed using RIVAL and STAR control products; no treatments were done to control crop diseases and one treatment was applied to control leaf pests. Harvesting was done at full plant maturity and was performed mechanically for each experimental field. For each experimental variant, plant samples were taken in order to perform biometrical measurements as well as grain samples to test physical characteristics and to determine the main bread and milling characteristics.

The determination of physical properties was done in order to assess TGW (thousand grain weight) and MH (hectoliter mass); these were separately determined for each variant. Milling quality analysis for grain yields were performed at SC VITAL SA – this unit having the most modern and updated equipments to determine the main quality characteristics of wheat grains for milling processes.

The experimental results obtained in 2006 were also influenced by the climate conditions, which proved to be less favourable for wheat crops and this being clearly reflected in most grain yields obtained for most wheat varieties cultivated in 2006 in comparison with yields obtained in 2004-2005. The analysis of cultivated wheat varieties pointed out the fact that in the most part of the vegetation period, the registered temperatures were below the multi-annual mean (February, March, May, June). The values of monthly mean temperatures are presented in table 1.

Table 1

Monthly mean temperatures (^{0}C) registered at Timisoara Meteorological Station in the period 2005-2006 comparing with multiannual means

Specification	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	IX
Year 2005/2006	11.1	5.0	1.3	-2	0	5	12.4	16.2	1..5	23.6	20.1	17.5
Multiannual means	11.3	5.7	1.4	-1.2	0.4	6.0	11.3	16.4	19.6	21.6	20.8	16.9
Deviation ±	**-0.2**	**-0.5**	**-0.1**	**+0.8**	**-0.4**	**-1.0**	**+1.1**	**-0.2**	**-0.1**	**+2.0**	**-0.7**	**+0.6**

If we are to refer to the precipitation level for the year 2006, this proved to be deficient in the first part (autumn) and this led to delayed plant emergence and a reduced number of tillers. Precipitation excess registered in December was insufficient and did not compensate moisture shortage that has been installed in November and December. The variation of precipitation comparing with multiannual mean is presented in the table below.

Table 2

Monthly mean precipitation (mm) registered at Timisoara Meteorological Station in the period 2005-2006 comparing with multiannual means

Specification	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	IX
Year 2005/2006	25.6	21.10	89.0	40.9	40.2	41.6	50.0	66.7	81.1	59.9	52.2	46.1
Multiannual means	54.8	48.6	47.8	40.9	40.2	41.6	50.0	66.7	81.1	59.9	52.2	46.1
Deviation ±	-29.2	-27.5	+44.2	0.0	0.0							

RESULTS AND DISCUSSION

Values of quality indices. The analysis of results concerning the hectoliter mass (HM) revealed that the agro- background had less influence on HM (table 3 and graphic 1). It has been also observed that the use of foliar fertilizers had positive influence on hectoliter mass. The highest values for hectoliter mass were registered for the following wheat varieties: CIPRIAN 80, 38 kg/hl, ALEX – 80.28 kg/ha, BAIKA 79.18 kg/hl, Lv 34 – 79.92 kg/ hl, GK. Othalom – 78.72 kg/ hl. Generally, wheat cultivated varieties present hectoliter mass values which allow their inclusion into good and very good classes for milling processes.

Table 3

Mean values of the hectoliter mass (HM- kg/hl) depending on variety and agro-background for the year 2006

No.	Varieties	a1	a2	a3	a4	a5	**Mean**
1	Ciprian	82.3	77.6	79.5	81.0	81.4	**80.4**
2	Alex	79.6	79.8	80.1	79.5	82.4	**80.3**
3	Serina	75.1	75.2	74.4	73.1	74.1	**74.4**
4	LV34	81.1	81.5	73.4	80.2	83.4	**79.9**
5	GK. Göbe	76.9	80.1	76.8	79.4	76.6	**77.3**
6	GK.Öthalom	77.6	80.1	78.6	78.7	78.6	**78.7**
7	Baika	79.2	82.1	79.3	77.1	78.1	**79.1**
Mean		**68.8**	**79.5**	**77.4**	**78.4**	**79.2**	

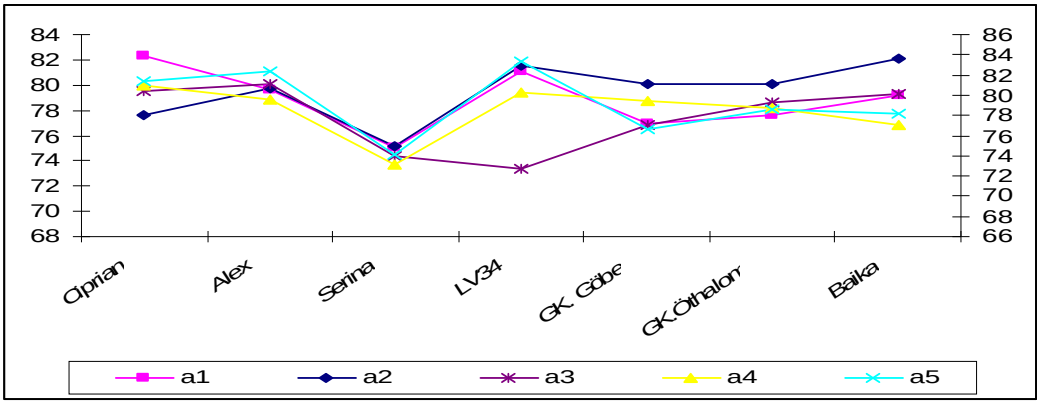

Figure 1. Variation of the hectoliter mass (HM– kg/hl) in terms of variety and agro-background for the year 2006

Falling number

The analysis of the obtained results emphasizes that this characteristic is not influenced by the agro-background (table 4 and graphic 2). The values for falling number considering the studied wheat varieties showed that, they may fall into satisfactory group. The high values of falling index (FN) are determined by low activity of alpha- amylase. The high values of falling index are favourable for milling quality of wheat grains. The highest mean values of falling index were registered for: CIPRIAN – 407 sec. and ALEX – 400 sec. varieties.

Table 4

Mean values of the falling index (FN – sec.) in terms of variety and agro-background for the year 2006

No.	Variety	a1	a2	a3	a4	a5	**Mean**
1	Ciprian	442	367	401	426	397	**400.6**
2	Alex	373	390	417	412	408	**400.0**
3	Serina	321	366	381	372	363	**360.6**
4	LV34	368	329	344	354	394	**357.8**
5	GK. Göbe	328	357	343	381	259	**333.6**
6	GK.Öthalom	328	390	399	374	399	**378.0**
7	Baika	362	346	369	374	374	**365.0**
Mean		**360.3**	**363.6**	**379.1**	**384.7**	**370.6**	

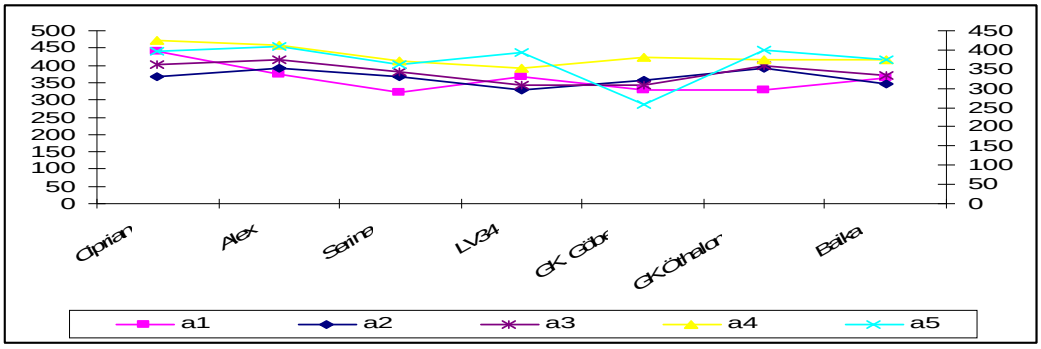

Figure 2. Variation of the falling index (FN – sec.) in terms of variety and agro-background for the year 2006

Moist gluten

The analysis of the obtained results, allowed us to conclude that nitrogen doses positively influenced the accumulation of average content of moist gluten which is regarded as an essential element of wheat grains used in the milling processes. With regard to average content of moist gluten, it has been observed that in the collection of wheat varieties submitted to our studies, several varieties registered moist gluten content over 30%: CIPRIAN – 31.42%, SERINA – 30.50%. The values of moist gluten are presented in table and graphic 3.

Table 5

Values of moist gluten (MG %) in case of 7 wheat varieties considering the influence of the agro-background for the study year 2006

No.	Varieties	a1	a2	a3	a4	a5	**Mean**
1	Ciprian	30.8	24.7	24.3	39.9	37.4	**31.4**
2	Alex	26.7	18.2	30.3	31.6	28.3	**27.0**
3	Serina	26.2	31.5	33.3	32.8	28.7	**30.5**
4	LV34	25.7	26.8	26.9	30.3	28.5	**27.6**
5	GK. Göbe	23.4	27.6	30.3	34.3	30.7	**29.3**
6	GK.Öthalom	25.2	30.9	28.4	28.2	28.4	**28.2**
7	Baika	11.6	15.7	19.6	21.2	15.6	**16.7**
Mean		**24.3**	**25.1**	**27.6**	**39.2**	**28.2**	

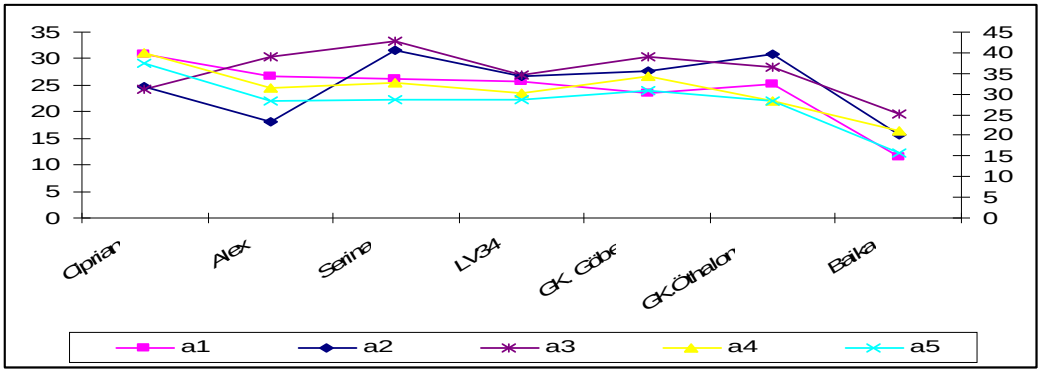

Figure 3. Graphical representation of moist gluten values (MG %) for 7 wheat varieties considering the influence of the agro-background for the year 2006

Gluten index (GI)

The analysis of the obtained results showed that the agro-background has no influence on Gluten index. Among wheat varieties studied by us, the following have registered high values of gluten index: BAIKA 92.80%, LV – 34 – 78.80% and ALEX – 69.60%. The values of gluten index are presented in table and graphic 4.

Table 6

Values of gluten index (GI %) for 7 autumn wheat varieties considering the influence of the agro-background for the study year 2006

No.	Variety	a1	a2	a3	a4	a5	**Mean**
1	Ciprian	52	71	52	47	39	**52.2**
2	Alex	68	69	69	73	69	**69.6**
3	Serina	46	51	6	44	51	**39.6**
4	LV34	75	79	86	70	84	**78.8**
5	GK. Göbe	83	52	49	45	67	**59.2**
6	GK.Öthalom	71	66	64	62	64	**65.4**
7	Baika	98	97	95	79	95	**92.8**
Mean		**70.4**	**69.3**	**60.1**	**60.0**	**67.0**	

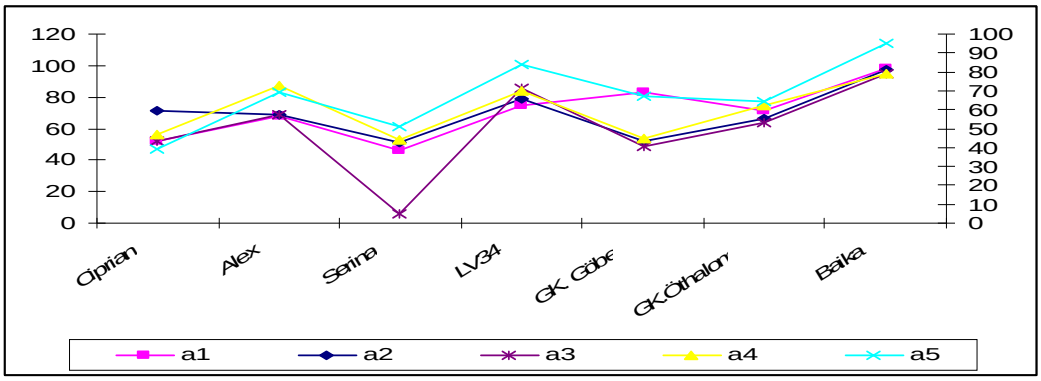

Figure 4. Variation of gluten index (GI %) in case of 7 autumn wheat varieties considering the influence of the agro-background for the study year 2006

CONCLUSIONS

The studied wheat varieties are widely cultivated in the West Field and have presented very good milling quality indices and thus to be considered valuable for the market and for milling and bread industry. They also enable plant growers to sell their products at very good prices and minimal inputs.

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