RESEARCH CONCERNING THE INFLUENCE OF SOME TECHNOLOGICAL FACTS ON YIELD AND YIELD QUALITY OF SOME AUTUMN CULTIVARS IN THE CONDITIONS OF BANAT

CERCETĂRI PRIVIND INFLUENȚA UNOR FACTORI DE TEHNOLOGIE ASUPRA PRODUCȚIEI ŞI CALITĂȚII ACESTEIA LA UNELE SOIURI DE GRÂU DE TOAMNĂ ÎN CONDIȚIILE DIN BANAT

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Abstract: *. In normal climate conditions and with good technology, Romania could produce yearly over 10 million t of wheat, of which about 6-7 t for bread-making (Tabara, 2004-2005). Romania has a series of very good wheat cultivars developed by the I.C.C.T. Fundulea, S.C.D.A. Lovrin, S.C.D.A. Turda, and others. The variation of bread-making quality indices from one year to another is due to a complex of factors among which the most important are climate and technology (fertilising and harvesting).*

Rezumat: *În condiţiile climatice normale şi tehnologie bună, România ar putea realiza anual peste 10 milioane tone grâu (din care cca 6-7 milioane tone pentru panificaţie – după Valeriu Tabără 2004-2005). România deţine o serie de soiuri de grâu de foarte bună calitate create la I.C.C.T. Fundulea, S.C.D.A. Lovrin, S.C.D.A. Turda şi altele. Variaţia valorilor indicilor de calitate panificabilă de la un an la altul se datorează unui complex de factori din care cei mai importanţi sunt cei climatici şi tehnologici (fertilizarea şi recoltarea).*

Key words**:** *wheat, bread-making quality indices, climatic factors, technological factors*
Cuvinte cheie: *grâu, indici de calitate panificabilă, factori climatici, factori tehnologici*

INTODUCTION

Harvested wheat grain that enters trade is classified according to grain properties (see below) for the purposes of the commodities market. Wheat buyers use the classifications to help determine which wheat to purchase as each class has special uses. Wheat producers determine which classes of wheat are the most profitable to cultivate with this system.

Wheat is widely cultivated as a cash crop because it produces a good yield per unit area, grows well in a temperate climate even with a moderately short growing season, and yields a versatile, high-quality flour that is widely used in baking. Most breads are made with wheat flour, including many breads named for the other grains they contain like most rye and oat breads. Many other popular foods are made from wheat flour as well, resulting in a large demand for the grain even in economies with a significant food surplus.

In Western Europe target wheat yields attainable are around 8 tonnes per hectare. Until recently a tonne of wheat was worth around 90 euros per tonne, giving a total income of €630 per hectare for an average yield of 7 tonnes per hectare. European Union subsidies available in 2006 add €400 per hectare, giving a total income of €1,030 per hectare. In some instances the straw yield of around 4 tonnes per hectare may be saleable at between €9 and €30 per tonne.

Wheat is still for Romania one of the most important agricultural crops (Bilteanu, 1973, 1993). At the same time, Romanian wheat has been subjected to trade on both the European and world markets.

After maize, wheat has an important share of the arable area of the country, i.e. about 2.0-2.2 million ha, with a production that, depending on climate conditions, oscillates between 4.2 and 7.5 million t.

Improving cultivation and harvesting technologies can turn Romanian wheat into very good bread-making quality wheat.

MATERIAL AND METHOD

In order to analyse quality features, we used a number of 8 native and foreign wheat cultivars that cover significant areas.

The cultivars we have studied are: Romanian cultivars: Dropia (the most cultivated one), Flamura85, Alex, Romulus, Lovrin34, and Ariesan; foreign cultivars: Partizanka (Serbia and Montenegro) and Serina (Hungary). The latter ones occupy larger areas in limitrophe counties. Measuring the value of bread-making quality indices of wheat cultivars was done at the S.C. Vital S.A. – Carani (County of Timis) and at the Institute for Food Bioresources in Bucharest.

The latter one makes systematic measurements of wheat quality in each year's crop. In this paper we present average values of the most important bread-making quality features of the cultivated wheat cultivars.

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 favorable for wheat crops.

Table 1

Monthly average temperatures (^{0}C) compared to multi-annual averages

Specif.	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Year 2005	0,0	-3,3	3,4	11,4	16,8	19,7	22,1	20,3	17,3	11,1	5.0	1.3
Year 2006	-2	0	5	12.4	16.2	19.5	23.6	20.1	17.5			
Multi-annual averages	-1,2	0,4	6,0	11,3	16,4	19,6	21,6	20,8	16,9	11,3	5,7	1,4

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 rainfall (mm) compared to multi-annual averages

Specif.	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Year 2005	32,3	67,8	45,5	154,4	49,8	35,1	45,2	142,4	84,6	25,6	21.10	89.0
Year 2006	30	42	49	71,8	50,2	87,8	50,4	98	21,2			
Multi-annual averages	40,9	40,2	41,6	50,0	66,7	81,1	59,9	52,2	46,1	54,8	48,6	47,8

RESULTS AND DISSCUSION

The synthesis of quality analysis results between 2005 and 2006 is shown in Table 3 and figure 3.

Table 3

Bread-making Quality in Some Wheat Cultivars in Romania (2004-2006)

Specification	Average quality indices between 2004 and 2006					
	Hectolitric volume (kg/hl)	**Fall index (sec)**	**Protein content (%)**	**Moist gluten (%)**	**Deformation index (mm)**	**Gluten index (%)**
Dropia	76,8	288	13,34	26,85	4,21	79
Alex	77,9	321	12,82	26,20	4,23	77
Flamura85	77,4	281	13,54	27,66	4,51	74
Lovrin34	77,6	296	12,74	26,04	5,05	74
Ariesan	76,7	264	12,69	27,13	4,54	48
Romulus	77,3	300	12,81	27,08	5,79	63
Partizanka	77,2	311	12,55	27,59	6,03	61
Serina	76,8	260	12,17	25,30	5,69	64
Standard Values of Bread-Making Wheat in Romania						
Very good	>78	206-250	>13	>26	<13	65-80
Good	75-78	180-200 250-280	12-13	24-26	13-16<5	40-6>80
Satisfactory	70-75	160-180>280	10-12	22-24	16-20	30-40
Unsatisfact.	< 70	<160	<10	<22	>20	<30
Qualifications for the Bread-Making Quality of the Studied Wheat Cultivars						
Dropia	Good	Satisfactory	Very good	Very good	Very good	Very good
Alex	Good	Satisfactory	Good	Very good	Very good	Very good
Flamura85	Good	Satisfactory	Very good	Very good	Very good	Very good
Lovrin34	Good	Satisfactory	Good	Very good	Very good	Very good
Ariesan	Good	Good	Good	Very good	Very good	Good
Romulus	Good	Satisfactory	Good	Very good	Very good	Good
Partizanka	Good	Satisfactory	Good	Very good	Very good	Good
Serina	Good	Good	Good	Good	Very good	Good

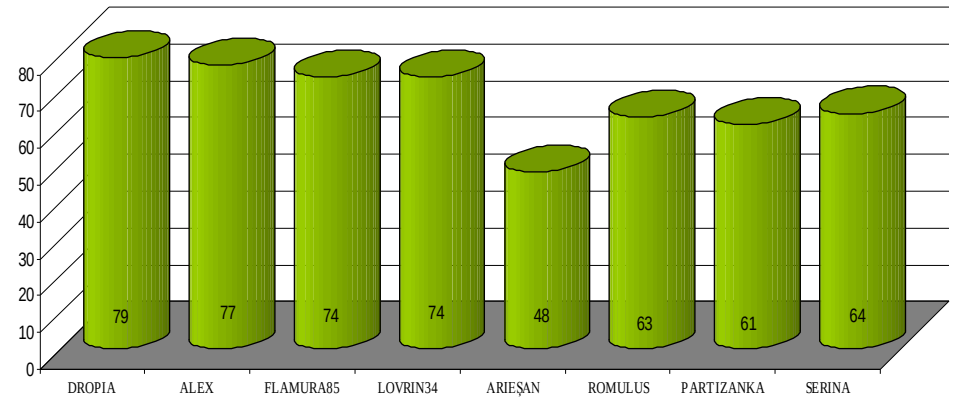

Figure 3. Gluten-index variation between 2004 and 2006

Analysing them we can see that climate conditions have a considerable influence on wheat bread-making quality features. Table 1 shows average values of bread-making quality indices of the wheat cultivars studied between 2004 and 2006. In most cases, average values of bread-making quality features show cultivars whose bread-making potential is 'good' and 'very good'. The following cultivars fall into this category: Dropia, Alex, Flamura85, and Lovrin34.

CONCLUSIONS

1. The cultivars we have studied have a genetic potential for the bread-making quality 'very good'.
2. Specific climate conditions have a positive or negative impact on bread-making quality indices (fall index); in higher-moisture conditions during maturity, there is a decrease in bread-making quality in wheat upon harvesting as a result of the increase of alphamylase activity.
3. Technology influences quality indices (smaller doses of fertilizers diminish protein and moist gluten content; attack by the *Eurigaster* sp. bugs during the formation and maturing period of the grains increases the deformation index and diminishes the value of gluten index and, therefore, its bread-making quality.
4. In optimal climate and technological conditions, wheat cultivars in Romania yield crops with very good bread-making quality indices, making it a very good produce for both the European and world markets.

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