

# BREADMAKING QUALITY OF SOME WINTER WHEAT CULTIVARS IN WESTERN ROMANIA IN 2008



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**REZUMAT.** Grâul este una dintre cele mai importante cereale și plante de cultură în România. Lucrarea prezintă indicii de calitate a unor soiuri de grâu autohtone și străine.

**Cuvinte cheie:** calitate panificabilă, fertilizare, soi.

**ABSTRACT.** Wheat is one of the most important cereals and crop cultivation in Romania. This paper presents the value of the quality indexes of some Romanian and foreign wheat varieties.

**Keywords:** quality indexes, fertilization, varieties.

## 1. INTRODUCTION

Winter wheat continues to be one of the most important crops, covering 220-230 million ha at world level. The greatest winter wheat cultivators are the USA, Canada, Argentina, Australia, China, and India. The greatest cultivators of the EU are France, Germany, Spain, etc.

In Romania, the average area cultivated with winter wheat in the last 20 years reaches about 2 million ha.

World production oscillates much depending on climate conditions; it has lately oscillated between 400 and 600 million t.

Part of the winter wheat production is kept for domestic consumption in producer countries, where it is food for people and feed for animals. Another part is

used as raw material for certain industries. These last years a considerable amount of winter wheat is used to produce alcohol (bio-ethanol).

A significant amount of winter wheat (about 50-100 million t) is traded and has been an important stock exchange index in Chicago, Paris, Hong-Kong, Amsterdam, etc.

Among great winter wheat exporters are the great winter wheat producers: USA, Canada, Argentina, Australia, etc. These countries dominate world winter wheat trade and also determine winter wheat price in most cases.

Soil and climate conditions are important not only for the domestic needs, but also for trade needs. Romania can really produce on the average 7 to 9 million t and a maximum between 10 and 12 t per year.

Productions above 4 to 6 million t in Romania have been 'beneficial' accidents (or even catastrophes, since we do not know what to do with either winter wheat or grain large productions).

It is certain that through good cultivation technologies Romania can produce not only enough winter wheat, but also quality winter wheat, since it has:

- favorable soil and climate conditions;
- native cultivars that are good producers and of quality;
- cultivation technologies not always at optimal level because of different lacks (equipment, finance, real support for quality winter wheat production);
- an artificial market dominated by speculators that prevent the real producers from acting on the market.

Under normal production conditions, Romania should rely annually on amount of quality winter wheat between 2 and 5 million t. Romania's winter wheat production should be supported both domestically and on the foreign market.

## 2. MATERIAL AND METHOD

In order to produce quality winter wheat, we need valuable cultivars that Romanian producers can valorize. Such cultivars have been developed at the ICDA Fundulea, SCDA Lovrin, SCDA Turda, SCDA Suceava, SCDA Caracal, etc.

Bread-making quality and nutritious value in winter wheat is given by the composition of the winter wheat grains, i.e.:

- fats in the embryo and in the aleuronic layer;
- starch only in the endosperm;
- mineral substances in the side parts and the pericarp which, upon grinding, turn mainly into bran;
- vitamins in the tegument and pericarp;
- proteins whose share of the winter wheat grain varies between 8 and 26%, pointing to technological quality and meal processing, to its turning into dough and then into bread assortments.

Protein content of winter wheat grains and their bread-making quality is strongly influenced by soil and climate conditions at micro-zone and macro-zone levels; thus, in the Mediterranean and oceanic climates, protein content of the winter wheat grains is lower, while in Central and Eastern Europe areas it is above 23%.

Soil nitrogen content determines the increase of protein substances in the winter wheat grains. In Romania, depending on the soil and climate conditions, and on fertilization, protein content of winter wheat grains can reach up to 9.35%.

Protein content of meal varies depending on the extraction degree:

- in white meal, whose extraction degree is 40%, protein content is on the average 10.8%;
- in wholesome meal, protein content is 11.8%;
- in bran, protein content is 14.9%.

Knowing these features is of particular importance in the field of bread-making.

There are also other elements that contribute to bread-making quality. Among them, the cultivar. Any winter wheat cultivator should have in mind a few essential elements if he wants to obtain high quality winter wheat:

- to choose the cultivar the best adapted to the zone features and, particularly, to the micro-zone where winter wheat is cultivated;
- to know and apply technologies that observes all winter wheat cultivation requirements.

Western Romania agricultural area – between Satu-Mare and Caraş-Severin – is one of the most important agricultural areas in Romania and one of the most favorable for winter wheat cultivation and for large productions of high quality.

In this area, they have been cultivating year after year winter wheat cultivars from the most varied sources: Romanian ones, developed at ICDA Fundulea (Dropia, Boema, De la Brad, Flamura 85, and Glosa); SCDA Lovrin (Alex, Romulus, Ciprian, and Lovrin 34); SCDA Turda (Arieşan); SCDA Oradea (Crişana). Beside them, they have also cultivated winter wheat cultivars from improving centers and also winter wheat cultivars from such countries as Serbia, Hungary, Bosnia-Herzegovina, and others.

The most important cultivars cultivated in the area in 2008 were: Alex, Romulus, Dropia, and Arieşan, among Romanian cultivars, and Serina, Jozsef, Rennesansa, Pobeda, Sanda, and others, among foreign ones.

To note that all five counties of the Western Romanian Plain do not cultivate triticale cultivars such as Titan, Tristar, Tril Star, and Vlădeasa.

Among winter wheat cultivars, the most widely cultivated ones are Alex (cultivated in all five counties), Arieşan, Dropia, and Romulus.

## 3. RESULTS AND DISCUSSION

We determined the main bread-making features of these Romanian and foreign winter wheat cultivars in the climate conditions of 2008 in the Western Romanian Plain (Table 1).

If we analyze the values of each of these features in the nine winter wheat cultivars, we see that they all have very good bread-making features.

Table 1. Main bread-making features of these Romanian and foreign winter wheat cultivars in the climate conditions of 2008 in the Western Romanian Plain

No.	Cultivar	Bread-making features					
		Hectoliter mass, kg/hl	Fall index, sec.	Protein, %	Moist gluten, %	Deformation index, mm	Gluten, %
1.	ALEX	78.1	341	12.57	25.97	4.23	84
2.	ARIEȘAN	77.5	358	11.98	25.32	1.88	62
3.	CIPRIAN	78.1	373	11.79	25.51	6.75	67
4.	DROPIA	79.6	329	12.83	26.38	3.50	76
5.	LOVRIN 34	79.4	368	13.36	28.55	2.50	83
6.	JOSZEF	79.3	404	14.44	31.34	5.00	79
7.	RENNESANSA	80.3	292	14.30	33.00	4.30	63
8.	ROMULUS	78.4	357	12.20	25.87	8.40	56
9.	SERINA	76.3	329	13.02	30.28	3.80	65

Thus, hectoliter mass (HM) expressed in kg/hl, varies between 76.3 kg/hl in the Serina cultivar, and 60.8 kg/hl in the Renasansca cultivar.

From the point of view of these features, all the cultivars range within the ‘good for bread-making group’ (the limit for bread-making is 75 kg/ha). To also note that most of the analyzed cultivars have a HM above 78 kg/ha which ranges them in the ‘very good for bread-making group’.

*Fall index* expresses alpha-amylase activity depending on climate conditions in which maturing and harvesting take place. The values of these features in the nine studied cultivars vary between 292 in the Renasansa cultivar and 404 in the Joszef cultivar. In order to be ranged in the ‘very good category’ for bread-making, the values of the fall index should be between 180 and 200 seconds. Values above 200-220 seconds range the studied cultivars in the ‘satisfactory group’ for bread-making. High values of the fall index are due to the fact that during maturation the weather was dry, which activated alpha-amylase. An amount of 10 mm rainfall at the end of maturation of winter wheat can lead to a fall index of up to 100 seconds. Higher values of the fall index also speak of the fact that winter wheat was harvested all over the reference area and in good conditions.

*Protein content* is one of the most important bread-making features and not only. At world level, in the bread-making industry, winter wheat whose protein content is above 12% and, from this point of view, the cultivars cultivated in the Western Romanian Plain range in the bread-making winter wheat group. There are only two exceptions: Arieșan, with an average protein content of 11.98% (about 12%) and Ciprian, with an average protein content of 11.79%. We should mention the fact that the Ciprian cultivar was cultivated

over smaller, but increasing areas. The value of protein content in the Ciprian cultivar is given by the average of two counties (Timiș and Arad). The analysis of the protein content points out the cultivars Ioszef and Renasansa whose protein content is above 14%. Here again we should mention that these cultivars are cultivated over smaller areas, the values supplied being the result of micro-zones.

*Most gluten content (GU%)* shows that all the nine cultivars range in the ‘good’ and ‘very good’ categories for bread-making, bearing in mind that, in order to be used in bread-making, winter wheat should contain at least 22% moist gluten. To also note the fact that in three of the nine cultivars we studied, moist gluten content is above 30%. There are cultivars that have a smaller share of cultivated areas. We should take into account the fact that in the cultivars consecrated to the reference area Alex, Drobia, and Ciprian – moist gluten content in optimal vegetation conditions and with proper cultivation technologies can easily be above 30%.

*Deformation index* – an essential feature is sometimes taken as a basis for assessing bread-making winter wheat quality; it varies between 1.88 mm in the Arieșan cultivar and 804 mm in the Romulus cultivar. The values of the deformation index in the nine winter wheat cultivars range them in the ‘very good’ category for the bread-making industry.

*Gluten index – (GI %)* is one of the most important bread-making features. Good bread-making quality winter wheat should have the values of gluten index between 65 and 80%. Values of 65-45% and values above 80% range winter wheat in the ‘good’ category for bread-making. We should nevertheless mention the fact that it is preferable to have grains with a gluten index above 80%. If we analyze the values of gluten index in the nine winter wheat cultivars, we see there is

wide variation. Practically, only Ciprian 67%, Dropia 76%, Jozsef 79%, and Serina 65% range between 65 and 80% gluten index, while Alex – 84% and Lovrin 34 – 83% have values above 65-80%. The cultivars Arieșan – 62%, Rennesansa – 63%, and Romulus – 56% range below 65-80%. But the latter too can be used in bread-making industry, with a few corrections, of course.

#### 4. CONCLUSIONS AND RECOMMENDATIONS

The results presented above allow us to draw a few conclusions:

- The winter wheat cultivars cultivated in the Western Romanian Plain have bread-making value and they show that the micro-zone is responsible for the low bread-making quality of Romanian winter wheat.

- Winter wheat cultivars developed in research units in Romania are not inferior to foreign winter wheat cultivars from the point of view of their bread-making quality.

- In order to express bread-making features at the required level in the field, we should improve cultivation technologies since they increase the cultivars' genetic potential from the point of view of the high bread-making quality.

- Knowing that all winter wheat cultivars have not all the bread-making features, we need to identify those factors that define winter wheat not fit for bread-making or winter wheat with poor bread-making features.

- We need to make a clear distinction between winter wheat bread-making quality genetic potential and winter wheat on the market and in the bread-making industry, whose bread-making features have been altered (how it was harvested, the moisture level at which it is stored, what happens between harvesting time and conditioning time, sorting, storage, and control of the storage factors that allow the preservation of certain bread-making features and their improvement).

- Western Romania area, from the Danube to the northern frontier is a basin of first class agricultural pro-

duction where winter wheat can be produced with very good bread-making features for both the Romanian and the foreign markets.

Knowledge available so far concerning the winter wheat assortment developed by Romanian researchers allow us to ask for more winter wheat cultivars that would make up a basis for the future and prevent Romanian from importing risk-carrying cultivars.

We ask decision-makers and bread-making manufacturers to be cautious when talking about bread-making quality of Romanian winter wheat cultivars:

- Genetically endowed bread-making winter wheat is one thing, and stored winter wheat sent to bread-making units is something else. We produce meal and produce from Alex winter wheat cultivar, that are exceptional in Hungary – why are they not also exceptional good fro Romania? The conclusion is that it is not the cultivar, but other factors that should be blamed.

- Both decision-makers and processors should put more trust in agricultural research and in the Institute for food bio-resources in Bucharest that managed to make a highly professional presentation of winter wheat quality upon harvesting in all areas and counties of Romania.

#### REFERENCES

- [1] Roman Gh.V., Ion V., Epure Lenuța Iuliana, *Fitotehnie – Cereale și leguminoase pentru boabe*. Editura CERES, Bucuresti, 2006.
- [2] L.S. Munteanu și colab, *Fitotehnie*, 2008, Ed. Academic Pres Cluj-Napoca. p. 84-85.
- [3] Tabără, V., Pușcă, I., *Calitatea, element esential pentru cultura grâului în România*. Rev. Agricultura României, nr. 10, 2002
- [4] Tabără V., Georgeta Pop, *A study of some bread-making quality features*. International Conference in collaboration with "Agritech", 7-9 May, 2006 Exhibition Advances in agricultural technologies and their ecological impacts, 2006.
- [5] V. Tabără, I. Pușcă, L. Wagner, Georgeta Pop, Simona Niță, Gabriela Gorinoiu, Monica Prodan, *Calitatea panificabilă a unor soiuri de grâu de toamnă în condițiile stațiuni de cercetări agricole Lovrin*, Buletinul AGIR, nr. 1-2 2008.