

## QUALITY ANALYSIS OF WHEAT HARVEST IN PRAHOVA COUNTY AS A PRELIMINARY STAGE OF THE CONDITIONING PROCESS

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### *Abstract*

*In recent years, claim processors compared to the quality of agricultural products, used as raw material in food industry has grown considerably. As we know, the quality of agricultural products it is influenced, first of all, by the technology applied for crop production, but, in the same time, if we need, also by the harvest conditioning. For this reason, this work paper is proposing a post-harvest analysis of quality indicators of wheat harvest grown in Prahova county.*

Keywords: wheat harvest quality conditioning

### 1. INTRODUCTION

The interest assessment for the agricultural products quality used as raw material in food industry it was stressed more and more lately, because the quality concept is a basic element for placing on the market of appropriate agri-food products.

The Prahova County with total area of 471.587 ha, owns 279.134 ha agricultural destination (59,2%), 152.222 ha forests and lands covered with forest vegetation (32,3%), 9.656 ha waters and ponds (2,0%), 30.575 ha lands with other destination (6,5%). In the agricultural area, arable land occupies 146.787 ha, accounting 31,1% of total area of the County.

Thus, it is very important as the wheat harvest designed to be used in milling-bakery industry, to be post-harvest analyzed in order to determine the grains moisture and impurities content.

### 2. MATERIAL AND METHOD

The biological material used is consisted of the range of varieties of wheat grown in Prahova County between 2007-2009.

**Alex.** Variety of winter wheat, created by SCDA Lovrin, approved in 1994. The plant is medium size (80-90 cm), with good capacity of twinning.

The ear is white, with beard, cylindrical-pyramidal, with a length of 6-9 cm. The grain is ovoid, red color, having the following qualitative characteristics: the mass of a thousand grains 45-50 g, the weight 78-80 kg/hl, index of sedimentation (Zeleny) between 64 și 76, gluten content is 20-30%.

The variety falls in the value of B1 group, being a variety that has very good quality indicators for bakery products. It presents a genetically potential of production of 7-8 t/ha. It is resistant to winter and medium resistance to fall, powdery mildew disease, brown and yellow rust. It is also resistant to sprouting grain in the ear.

Optimal cultivation areas are the lowlands and West of the country.

**Boema.** Variety of winter wheat, created by INCDA Fundulea. The plant is medium size (82 cm), the mass of

a thousand grains 41 g and weight of 77 kg. It is in the same group of precocity with Flamura 85 variety.

It is resistant to winter, heat, drought, fall and shaking. Is resistant to yellow rust and medium resistant to brown rust. It is also more resistant to Fusarium and sprouting grain in the ear than Fundulea 4 and Flamura 85 varieties.

Fall into the group of varieties with superior qualities of bread. Averaged over 3 years has achieved a production of 6114 kg/ha.

It is advisable to cultivate in the South and West of the country, as well as in irrigation conditions.

**Drobia.** Wheat variety created by I.N.C.D.A. Fundulea. Ear is large, fusiform, beard and white at maturity.

The grain is large and red. The mass of a thousand grains has values between 44 și 48 g and weight between 73 și 80 kg/hl. Vegetative period is 239—267 days.

It has a good resistance to winter and fall. It is resistant to powdery mildew disease, medium resistant to yellow rust and septoriosi and medium sensitive to brown rust. At the same time, show sensitivity to fusariosi, sprouting grain in the ear and toxicity of aluminum ions, preferring soils with pH neutral or slightly acidic.

Fall into the quality group of B1-A2, with a protein content of 13-14,8%, wet gluten 23,3% - 38,8% and dry gluten 9,2-15,4%.

It is a variety of intensive type with a high production capacity, making the normal productions over 6300 kg/ha.

**Flamura 85.** Variety of winter wheat created by INCDA Fundulea. It is a variety of wheat approved in 1989.

The plant is medium size (80-90 cm) and a good resistance to fall. The ear is white with beard. It is an early variety, resistant to winter, heat, powdery mildew disease and medium resistant to septoriosi and yellow rust. The grain is large and red, with mass of a thousand grains between 42-45 g. Quality bakery and milling characteristics are very good. Variety with high production (6-8,5 t/ha), is recommended in the South of the country, in irrigated and non-irrigated conditions.

**Fundulea 4.** Variety of winter wheat created by INCDA

Fundulea. The ear is big, cylindrical, white, with beard. The plant is medium size (80-90 cm), with a good resistant to fall, medium resistant in the winter and at high temperatures of the grain filling period.

It is resistant to black and yellow rust, medium resistant to brown rust and powdery mildew disease. The grain is large and red, with mass of a thousand grains between 41-45 g. Quality bakery and milling characteristics are very good.

Variety with high production (8-9,5 t/ha), is recommended in the South of the country, in irrigated and non-irrigated conditions and in West of country and Moldova on the fertile soils with water supply.

**Magdalena.** Variety of winter wheat created by Martonvasar Research Center, Hungary.

Plants are tall and elastic, with good resistance to fall, even in the rainy years. From the qualitative point of view, the variety has a high gluten content (over 35% wet gluten), flour resulted from it forming an elastical and expandable dough, resulting a bread with a large volume. It is a productive variety, with an average production of 7-7,5 t/ha in favourable years.

**Serina.** Variety of winter wheat created by Kiskun Research Center, Hungary.

Plants have an average height of 88 cm, mass of a thousand grains of 40 g and weight of 78 kg. Is a later liner with the 4-5 days from Fundulea 4.

It is medium resistant to winter conditions and fall and sensitive to heat. It is medium sensitive to septoriosiis, yellow rust, powdery mildew disease and is sensitive to brown rust and blackening ears.

Fall into the group of varieties with good quality attributes for the bakery. Averaged over 3 years has achieved a production of 5642 kg/ha in the area South and West of the country and 5677 kg/ha in Transylvania and Moldova.

It is recommended to grow in areas favorable to the winter wheat crop in the South, West and Dobrogea, Transylvania and Moldova.

Distribution area of wheat varieties grown in Prahova County, during the research period is presented in table number 1.

Samples of wheat was analyzed in the Institute of Bioresources Food laboratories from Bucharest, after standardized methods accredited by RENAR. Selected quality indicators was:

- a) weight kg/hl;
- b) grain moisture %;
- c) protein content %;
- d) wet gluten %;
- e) gluten deformation number mm;
- f) broken grains %;
- g) shrivelled grains %;
- h) foreign bodies (organic and inorganic)%;
- i) harmful and/or toxic grains %;
- j) grains with brand %;
- k) purple claviceps %.

**Table 1. Distribution area of wheat varieties grown in Prahova County**

Variety	Location		
	First year of study	Second year of study	Third year of study
Alex	Mizil	Ploiesti Zona Urlati	Colceag
	Fulga	Ploiesti	Paulesti
	Ciorani	-	-
	-	Ploiesti Zona Mizil	-
Boema	Draganesti	Ploiesti ZonaGherghita	Mizil
	Baba Ana	Ploiesti	Colceag
	-	Ploiesti Zona Baicoi	Ciorani
	-	-	Urlati
Dropia	Rafov	Ploiesti Zona Gherghita	Colceag
	Aricestii Rahtivani	Ploiesti Zona Urlati	Tomsani
	Barcanesti	Ploiesti Zona Mizil	Draganesti
	-	Ploiesti	Ploiesti
	-	-	Puchenii Mari
Flamura 85	Colceag	Ploiesti	Baba Ana
	Ploiesti	Ploiesti Zona Mizil	Colceag
Fundulea 4	Albesti	-	-
	Paleologul	-	-
Magdalena	-	Ploiesti	-
Serina	Fantanele	-	-

### 3. RESULTS AND DISCUSSIONS

The data contained in table 2 shows us that the wheat harvest, in first year of study, in Prahova County registered very good values regarding, the weight, with an average of 80,68%.

Also, the content of grains moisture had very good values, with an average of 11.15%.

This year Alex, Boema, Dropia and Flamura 85 varieties had over 13% protein content, while Fundulea 4 and Serina less than 13%.

The wet gluten content had values over 26% for all the grown varieties, with an average of 27,79%.

The gluten deformation number had values between 3,83 mm (Dropia) and 6 mm (Serina), the County average being 4,94 mm.

**Table 2. Quality indicators (physical and chemical tests) of harvest wheat in Prahova County, first year of study)**

Variety	Physical and chemical tests				
	Weight (kg/hl)	Moister (%)	Protein content (%)	Wet gluten (%)	Gluten deformation
Alex	80,63	10,55	13,09	27,74	5,83
Boema	81,35	11,62	13,09	27,36	4,50
Dropia	82,00	10,86	13,68	32,87	3,83
Flamura 85	80,65	11,62	13,19	27,52	5,00
Fundulea 4	81,90	10,13	12,22	24,75	4,00
Serina	77,60	12,15	12,07	26,49	6,00
Average	80,68	11,15	12,89	27,79	4,94

Regarding the impurities (table 3), it was found a significant presence of broken grains at Fundulea 4 variety (3,10%) and Serina variety (8,57%), the rest of the varieties having values under 2%; the average county value was 2,43%. The percentage of shrivelled grains registered very good values, with an average County values of 0,15%.

It has been observed an insignificant presence of foreign bodies organic and inorganic for all varieties, with values under 1% and an average County of 0,40%.

In 2007 was not observed the presence of harmful and/or toxic grains, grains with brand and purple claviceps.

**Table 3. Quality indicators (impurities) of harvest wheat in Prahova county (first year of study)**

Variety	Impurities					
	Broken grains (%)	Shrivelled grains (%)	Foreign bodies (%)	Harmful and/or toxic grains (%)	Grains with brand (%)	Purple claviceps (%)
Alex	0,62	0,14	0,35	0	0	0
Boema	1,02	0,05	0,62	0	0	0
Dropia	0,71	0,02	0,30	0	0	0
Flamura 85	0,57	0,04	0,13	0	0	0
Fundulea 4	3,10	0,65	0,23	0	0	0
Serina	8,57	0	0,79	0	0	0
Average	2,43	0,15	0,40	0	0	0

In table 4 are presented dates regarding the physico-chemical indicators of the wheat harvest for the varieties grown in 2008 in Prahova County.

In this table we can observe that the all varieties registered very good values of weight (78-79 kh/hl) with an County average of 78,56 kh/hl.

Grains moisture had values under 13% for all studied varieties, with an County average of 12,37%.

This year the protein content has ben between 11,23% (Dropia) and 12,92% (Magdalena), with an average of County of 11,78%. The best value of wet gluten content has been registered at Magdalena variety (27,44%), good value had Flamura 85 (23,07%), the rest of the varieties with poor value; the County average value has been 22,88%.

The gluten deformation number, except Magdalena variety (6,5 mm), at the rest of varieties recorded values under 4 mm, the County average being 3,63 mm.

**Table 4. Quality indicators (physical and chemical tests) of harvest wheat in Prahova County (Second year of study)**

Variety	Physical and chemical tests				
	Weight (kg/hl)	Moister (%)	Protein content (%)	Wet gluten (%)	Gluten deformation number (mm)
Alex	77,86	12,54	11,34	20,78	3,50
Boema	79,16	12,06	11,32	21,37	2,16
Dropia	78,55	12,64	11,23	21,76	2,75
Flamura 85	78,75	12,45	12,09	23,07	3,25
Magdalena	78,50	12,19	12,92	27,44	6,50
Average	78,56	12,37	11,78	22,88	3,63

As impurities (table 5), the determinated values of broken and shrivelled grains have been under maxim levels, with an average county values of 2,08% and, respectively, 0,13%.

In according with the obtained results, in this year we registered high values of foreign bodies (organic and inorganic) at Magdalena variety (1,11%), the rest of the varieties having values under 1%.

Dropia variety have been recorded, with insignificant values, harmful and/or toxic grains (0,02%) and grains with brand (0,01%).

In this year was not observed the presence of purple claviceps.

**Table 5. Quality indicators (impurities) of harvest wheat in Prahova county (Second year of study)**

Variety	Impurities					
	Broken grains (%)	Shrivelled grains (%)	Foreign bodies (%)	Harmful and/or toxic grains (%)	Grains with brand (%)	Purple claviceps (%)
Alex	2,39	0,09	0,22	0	0	0
Boema	2,18	0,21	0,29	0	0	0
Dropia	1,94	0,05	0,19	0,02	0,01	0
Flamura 85	1,93	0,06	0,35	0	0	0
Magdalena	2,26	0,30	1,11	0	0	0
Average	2,08	0,13	0,41	0,003	0,001	0

The wheat harvest in Prahova County, in thirist year of study (table 6), showed values beteen 75-77 kg/hl

regarding the weight. The grains moisture content had values under 14%, with an County average value of 12,96%. An protein content over 13% has been registered only Dropia variety (13,28%), with an County average of 12,55%. Concerning the content of wet gluten it can be observed that the Dropia variety with 30,01 %, while the rest of varieties registered values under 25%.

The gluten deformation number had good value for all varieties, with a County average of 4,56%.

**Table 6. Quality indicators (phisical and chemical tests) of harvest wheat in Prahova County (third year of study)**

Variety	Physical and chemical tests				
	Weight (kg/hl)	Moister (%)	Protein content (%)	Wet gluten (%)	Gluten deformation number (mm)
Alex	76,25	12,98	11,88	19,39	2,00
Boema	76,52	13,34	12,39	24,45	3,12
Dropia	75,78	12,85	13,28	30,01	2,90
Flamura 85	76,65	12,67	12,68	24,96	10,25
Average	76,30	12,96	12,55	24,70	4,56

The observed values of impurities (table 7), shown us that the broken and shrivelled grains had an insignificant prezenze for all grown wheat varieties. Also, we registered an insignificant presence of foreign bodies (organic and inorganic) for all grown wheat varities, with an average county value of 0,51%. In this year, harmful and/or toxic grains and grains with brand where present both Alex variety and Dropia variety, both indicators having values under 0,05%. In 2009, purple claviceps has not been revealed at none of the varieties grown in this county.

**Table 7. Quality indicators of harvest wheat in Prahova county (third year of study)**

Variety	Impurities					
	Broken grains (%)	Shrivelled grains (%)	Foreign bodies (%)	Harmful and/or toxic grains (%)	Grains with brand (%)	Purple claviceps (%)
Alex	2,01	0,06	0,27	0,01	0,01	0
Boema	1,77	0,20	0,48	0	0	0
Dropia	2,33	0,39	0,63	0,01	0,01	0
Flamura85	0,60	0,06	0,37	0	0	0
Average	1,67	0,17	0,51	0,005	0,005	0

#### 4. CONCLUSIONS

- From the physico-chemical indicators point of view, in the first year of study, the wheat harvest registered very good average values, being characterized by a high content of protein (12,98%) and wet gluten (27,79%).
- Although in first year of study the wheat harvest of

varieties grown in Prahova County registered very good average values for impurities content, stands out the Fundulea 4 variety and Serina variety with a high broken grains content (3,10% and respectively, 8,57%);

- Although in the second year of study the physico-chemical indicators of wheat harvest registered low values for majority of varieties, stands out the Magdalena variety with a protein content almost 13% and wet gluten over 27%;

- In the same year the wheat harvest at Magdalena variety registered high values regarding foreign bodies (organic and inorganic) content (over 1%), the average county values for all analyzed indicators being under maxim level;

- In the third year of study, from the physico-chemical indicators point of view, the wheat harvest had good average values, emphasizing the protein content and wet gluten for Dropia variety (13,28%, respectively, 30,01%);

- The impurities indicators analyzed in the third year of study registered good values fot all varieties grown in Prahova County;

- The average region data for all three years of studynotice that the wheat harvest grown in Prahova County registered good values for all selected indicators, with mention that at some varieties it can find a significant presece of broken grains and foreign bodies (organic and inorganic);

- In Prahova County, the wheat harvest of varieties grown in all study years not registered purple claviceps.

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