

STUDY REGARDING THE BAKERY QUALITY OF WHEAT HARVEST IN SOUTHERN PLAIN AND DOBROGEA

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Abstract

The knowledge of the wheat quality used as raw material in the milling-bakery industry is very important, because the quality of bakery products depend, mainly, of the row material quality. From this point of view, the processors of milling-bakery industry want to acquire wheat with a high quality, than the farmers to cultivate those wheat varieties, that give good quantity and quality results every year. This study had as a principal aim the identification of the wheat variety cultivated during 2008-2009 years in the counties of South Plain and Dobrogea Area and the setting of quality potential of these varieties. Thus, were performed Laboratory determinations on the harvest of wheat varieties grown in the period studied, regarding the following indicators of quality and food safety: hectoliter weight, seed moisture content, protein content, wet gluten content, the deformation index, grains with Fusarium and grains attacked by grain bug. From the paper work date remark that the analyze quality indicators have different values on years and varieties, for the wheat harvest from this area.

Keywords: wheat varieties, quality indicators, milling-bakery industry

1. INTRODUCTION

The cereals are one of the most important plants group, which from their processing, obtaining a very large range of food. From the cereals group, the wheat is the most important, because is used as raw material in feeding products and in the milling-bakery industry. As we know, bread and the other bakery products are the basic food for consumers. So, to have bakery products with a good quality, we must to know very well the quality of wheat used as row material in milling-bakery industry. The study had, as a main purpose, the identification of the biological material range used to sowing the surfaces filled with wheat during 2008-2009 years in Southern Plain and Dobrogea counties and to establish the quality potential of these varieties.

The Southern Plain and Dobrogea Area is located in South and South-East Area of our country and it has a surface of 4.101.349 hectares, which means 17,2% from total surface of Romania. This area include the following counties: Brăila, Călărași, Constanța, Giurgiu, Ialomița, Ilfov, Telorman, Tulcea and the agricultural area of Bucharest.

2. MATERIAL ȘI METHODS

The biological material used it was the whole range of wheat varieties, which was cultivate in Southern Plain and Dobrogea during 2008-2009 period, respectively: Alex, Antonius, Apache, Arieșan, Boema, Capo, Cornelius, Crina, Daciana, Dor, Dropia, Drobeta, Flamura 85, Fundulea 4, Glosa, Gruia, Kiskun Gold, Kristina, GK Ati, GK Hargita, GK Hunyad, Jubilejnaja, GK Kalasz, SW Maxi, GK Miska, Renan, Romulus, Serina.

The wheat samples taken from the field where analyzed to determinate the bakery quality. The analysis where

performed at the Institute of Food Bioresources, Bucharest, according to standardized methods accredited RENAR. The quality indicators which was detrminted are:

- a) hectoliter weight;
- b) seed moisture content;
- c) protein content;
- d) wet gluten content;
- e) the deformation index;
- f) grains with *Fusarium*;
- g) grains attacked by grain bug.

3. RESULTS AND DISCUTIONS

From the dates showed in table 1, we can observe that in 2008 the quality indicators analyzed have different values for the wheat harvest in Southern Plain and Dobrogea counties. Thus, regarding the hectoliter weight, the highest value was in Teleorman county (81,82 kg/hl) and the lowest value was in agricultural area of Bucharest (75,00 kg/hl), the average value being 78,05 kg/hl.

On the other way, the wheat harvest for this year had an average protein content of 12,27%, with maximum at the wheat cultivate in agricultural area of Bucharest (12,92%) and minimum in Ilfov county (11,18%).

The wet gluten content was unsatisfy in Ilfov county (21,81%, minimum value) and Constanța county (22,46%). The remaining counties recorded values over 23%, with the best results being Braila (26,26%, the highest value), Calarasi (25,51%) and Teleorman (26,04%) counties; the zonal average was 24,16%.

At the analysis of deformation index obtained results under 13 mm for all Southern Plain and Dobrogea counties, the highest value in Tulcea (12,91 mm) and the lowest in agricultural area of Bucharest (4,50 mm); the zonal average value was 7,80 mm.

A higher value of grains with *Fusarium* can be observed in Ilfov (1,16%), the remaining counties recording value under 0,20%; the agricultural area of Bucharest does not have an attack of *Fusarium*.

The attack by grain bug (*Eurygaster integriceps*), was stronger in Tulcea (1,07%, maximum value), in the remaining counties the attack was under 1%, with minimum Calarasi (0,24%).

Table 1. The average quality of the wheat crop in South Plain and Dobrogea counties (2008)

County	Physico-chemical Indicators					Foreign matter	
	Hectoliter weight (kg/hl)	Moisture (%)	Protein Content (% s.u.)	Wet gluten (%)	Deformation Index (mm)	Grain Fusarium attack (%)	Grain Bug Attack (%)
Brăila	79,23	11,39	12,72	26,26	5,02	0,05	0,28
București	75,00	11,38	12,92	23,85	4,50	0	0,27
Călărași	77,12	11,47	12,81	25,51	9,64	0,09	0,24
Constanța	78,44	12,63	11,56	22,46	6,62	0,06	0,62
Giurgiu	78,46	10,59	12,03	24,49	7,44	0,14	0,44
Ialomița	78,30	11,51	12,42	23,25	5,50	0,20	0,34
Ilfov	76,27	11,32	11,18	21,81	10,35	1,16	0,52
Teleorman	81,82	11,13	12,57	26,04	8,23	0,30	0,65
Tulcea	77,76	12,24	12,22	23,76	12,91	0,05	1,07
Media	78,05	11,52	12,27	24,16	7,80	0,23	0,49

In table 2 are showed dates regarding the average quality of wheat harvest for varieties cultivated in Southern Plain and Dobrogea in 2008. Regarding the hectoliter weight, the highest value was at Fundulea 4 variety (82,70 kg/hl) and the lowest at Dor variety (71,00 kg/hl).

The wheat harvest in 2008 for this area was characterized through relatively low content of protein. The highest content was 12,91% at Glosa variety and the lowest 9,84% at GK Kalasz variety; most of varieties recorded 11-12% of protein content.

Regarding the content and gluten quality from table 2 result existence of some wheat varieties that the wet gluten content had unsatisfactory values, respectively, under 22%. From this point of view, the best varieties was Apache (26,20%), Dropia (25,01%), Glosa (27,81%), GK Hargita (27,49%), GK Miska (26,97%), Renan (26,83%) și Romulus (25,36%). Poor quality varieties were Capo (21,57%), Crina (21,51%), Jublijana (21,73%), GK Kalasz (18,48%) și Serina (20,81%).

At the analysis of deformation index, Fundulea 4 variety stand out with an extremely high value (28,50 mm); the remaining varieties had values under 14 mm and the lowest was found at GK Kalasz variety (2,00 mm).

It was found a grain bug attack (*Eurygaster integriceps*) at most of varieties, stronger at Capo variety (1,47%, maximum value) and GK Hunyad (1,37%), the remaining results being under 1%. Daciana, GK Hargita, GK Kalasz, SW Maxi și GK Miska varieties did not record grain bug attack.

Except Cornelius variety (0,87%), the *Fusarium* attack on wheat grain was under 0,55%, with minimum 0,02% at Romulus variety. Arieșan, Dor, Fundulea 4, GK Hunyad, Jublijana și GK Miska varieties did not manifest *Fusarium* attack.

Table 2. The average quality of the wheat varieties cultivated in South Plain and Dobrogea (2008)

Variety	Physico-chemical Indicators					Foreign matter	
	Hectoliter weight (kg/hl)	Moisture (%)	Protein Content (% s.u.)	Wet gluten (%)	Deformation Index (mm)	Grain Fusarium attack (%)	Grain bug attack (%)
Alex	77,74	11,59	11,99	23,38	8,08	0,15	0,42
Apache*	81,70	10,31	12,10	26,20	7,00	0,30	0,78
Arieșan*	79,70	11,10	11,67	23,87	9,00	0	0,37
Boema	79,08	11,59	12,31	23,93	10,05	0,34	0,41
Capo	78,37	10,33	11,93	21,57	8,30	0,06	1,47
Cornelius*	77,60	9,68	11,27	24,11	12,00	0,87	0,28
Crina	75,95	12,26	11,35	21,51	9,62	0,04	0,52
Daciana*	73,70	11,43	11,51	23,01	3,50	0,52	0
Dor*	71,00	13,63	11,17	22,47	7,25	0	0,45
Dropia	78,89	11,55	12,55	25,01	7,36	0,23	0,50
Flamura 85	78,38	11,71	12,10	24,37	10,52	0,18	0,59
Fundulea 4*	82,70	12,35	11,66	24,64	28,50	0	0,58
Glosa	79,72	11,05	12,91	27,81	5,50	0,07	0,05
Kiskun Gold	78,35	11,69	10,80	22,99	7,12	0,21	0,74
GK Hargita*	79,30	8,95	12,11	27,49	3,50	0,08	0
GK Hunyad*	78,40	11,32	11,56	24,07	13,00	0	1,37
Jubilejnaja	79,35	12,18	11,52	21,73	13,00	0	0,42
GK Kalasz*	73,30	13,33	9,84	18,48	2,00	0,08	0
SW Maxi*	78,70	11,15	12,18	24,71	4,00	0,55	0
GK Miska*	77,60	11,74	12,54	26,97	4,50	0	0
Renan	76,36	10,86	12,72	26,83	6,00	0,06	0,72
Romulus	77,50	12,13	12,36	25,36	3,00	0,02	0,44
Serina	76,99	11,83	10,69	20,81	5,66	0,22	0,69

*single county

Dates regarding the average of wheat harvest quality in Southern Plain and Dobrogea in 2009 (table 3) show that the highest hectoliter weight value it was in Tulcea (77,27 kg/hl) and the lowest in Constanța (73,44 kg/hl); the zonal average was 74,91 kg/hl.

The protein content of the wheat harvest in 2009, in the Southern Plain and Dobrogea, it was (average) 12,54%, with maximum de 13,03% în Teleorman and minimum e 11,66% in Constanța.

Regarding the content and gluten quality (tabel 3) results that the wet gluten indicator recorded unsatisfactory values in most of the counties. From this point of view, the best wheat was harvested in Ilfov county (24,26%); remaining counties have content values under 24%, the lowest is found Brăila (15,61%) and zonal average was 19,62%.

At the analysis of deformation index resulted values under 13 mm for all counties from this area. The highest values was recorded in Ialomița county (11,34 mm), the lowest value in Ilfov (3,25 mm) and zonal average was 7,02 mm.

About the wheat grain attacked by grain bug (*Eurygaster integriceps*), was found a strong attack in most of counties. Values over 10% were recorded in Călărași (11,16%, maximum value) and Constanța (10,19%), the zonal average being 3,98%; values under 1% was found in Brăila (0,62%) and Ilfov (0,44%).

Regarding the *Fusarium* attack, the values were under 0,60%; the low value resulted in Tulcea (0,004%) and the highest in Ialomița (0,51%). In Ilfov county did not find *Fusarium* attack.

Table 3. The average quality of the wheat crop in South Plain and Dobrogea counties (2009)

County	Physico-chemical Indicators					Foreign matter	
	Hectoliter weight (kg/hl)	Moisture (%)	Protein Content (% s.u.)	Wet gluten (%)	Deformation Index (mm)	Grain Fusarium attack (%)	Grain bug attack (%)
Brăila	76,69	11,87	12,75	15,61	5,51	0,01	0,62
Călărași	73,68	12,01	12,82	17,89	5,51	0,39	11,16
Constanța	73,44	12,81	11,66	16,71	9,25	0,29	10,19
Giurgiu	74,41	12,30	12,16	20,79	6,73	0,19	1,25
Ialomița	73,62	11,53	12,49	20,46	11,34	0,51	4,65
Ilfov	75,45	11,54	12,46	24,26	3,25	0	0,44
Teleorman	74,72	11,65	13,03	22,95	7,05	0,11	1,61
Tulcea	77,27	12,38	12,96	18,28	7,50	0,004	1,91
Media	74,91	12,01	12,54	19,62	7,02	0,19	3,98

In 2009 (table 4), the varieties cultivated in Southern Plain and Dobrogea area had low values of hectoliter weight. The highest value of hectoliter weight was found at Gruia variety (78,00 kg/hl) and the lowest at GK Ati (65,70 kg/hl).

The wheat harvest in 2009 in this area was characterized through relatively low content of protein for all varieties with one exception, the GK Ati variety (14,30%). The lowest content was determined at Jubilejnaja variety (9,66%).

In terms of the content and gluten quality, table 4 show that the data are unsatisfactory, with two exception, respectively, at Dor variety (28,69%) and Gruia variety (23,61%).

Analyzing the deformation index, were found Dor variety (15,50 mm) and GK Ati (13,50 mm). The remaining varieties had the deformation index under 10 mm and the lowest value noted at Apache variety (1,50 mm).

With Gruia variety exception, the attack of grain bug (*Eurygaster integriceps*) was recorded at all the varieties cultivated in Southern Plain and Dobrogea area. The most wheat harvest attacked belonged Dor variety (peste 90% atac) and Jubilejnaja variety (peste 50% atac). Value under 1% were recorded at Crina and Cristina variety.

About the *Fusarium* attack on wheat grain, were recorded value under 0,5% (minimum value at Rena variety-0,01%) with an exception, the Jubilejnaja variety.

Table 4. The average quality of the wheat varieties cultivated in South Plain and Dobrogea (2009)

Variety	Physico-chemical Indicators					Foreign matter	
	Hectoliter weight (kg/hl)	Moisture (%)	Protein Content (% s.u.)	Wet gluten (%)	Deformation Index (mm)	Grain Fusarium attack (%)	Grain bug attack (%)
Alex	74,18	11,96	12,51	20,63	7,92	0,37	5,01
Antonius*	72,80	12,58	11,85	19,56	8,00	0	1,00
Apache*	69,52	11,63	13,91	5,16	1,50	0,07	20,98
Boema	74,56	11,86	12,77	19,58	7,03	0,26	3,22
Capo*	69,35	12,47	10,31	16,26	6,50	0,31	18,72
Crina	75,35	12,29	12,99	18,52	6,45	0,24	0,50

Kristina	76,35	12,54	11,59	8,86	8,25	0	0,75
Dor*	74,90	11,87	9,70	28,69	15,50	0	90,52
Drobeta*	77,80	12,62	10,33	22,02	7,00	0	4,31
Dropia	75,60	12,18	12,63	20,33	7,73	0,16	2,26
Flamura 85	74,73	11,90	12,62	21,01	7,57	0,10	5,94
GK Ati*	65,70	11,59	14,30	19,60	13,5	0	8,67
Glosa	75,28	12,21	11,78	19,38	4,55	0,27	1,17
Gruia*	78,00	10,99	12,05	23,61	6,50	0	0
Jubilejnaja*	71,50	13,24	9,66	7,85	2,75	0,53	52,54
Renan	73,32	12,09	12,39	19,68	8,58	0,01	2,65

4. CONCLUSIONS

After studies during 2008-2009 regarding the bakery quality of wheat harvest in Southern Plain and Dobrogea area detach the following issues:

- In generally, it comes out that presence of national and foreign varieties;

- The 2008 is characterized by a wheat crop production with 11 - 12 % of protein content because the weather was dry and droughty during the forming and filling of wheat kernels;

- As a zonal potential, in 2008 the Brăila and Teleorman counties had the average wheat crop production with high bakery quality indicators. The low level from this point of view was registered in Ilfov county;

- Drobeta, Glosa and Renan varieties has registered in 2008 a crop production with good bakery indicators ;

- In 2008 the crop production of Crina, Kiskun Gold, GK Kalasz and Serina have been the most affected varieties from the bakery indicators of view;

- From the analization of the average data for the South Plain and Dobrogea area, it comes out that the value obtained for wet gluten and for wheat grain attacked by grain bug, the crop production in 2009 it was satisfactory for the bakery quality indicators.

- the varieties was cultivated in 2009 has registered a crop production with bakery quality indicators less than varieties cultivated 2008.

5. BIBLIOGRAPHY

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