



Comparative Evaluation of Chemico-Physical and Rheological Characteristics of Some Wheat Cultivars that Produce and Processed in Albanian Factories

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Abstract

Based on the qualitative assessment study about wheat produce and processed in Albania, with specific radius of flour and a variety of baking products, there are defined the chemico-technological characteristics of them and possibility of adding additives such as redox agents. The main types of wheat cultivars grown and processed are Agimi, Europe, Progres (Albania), Ankor (Russia), and Apache (France), which are included in this study. The main types of wheat varieties produce and processed are Agimi, Europe, Progres (Albania), Ankor (Russia), and Apache (France), which are included in this study. To bring a much cleaner picture about the varieties mentioned above, the study includes detailed analysis of technological attributes ranging from the preparation of varieties for milling, grinding them, where we acquired two types of flours Type-500 and type-850, physico-chemical and rheological analysis of flour, also the bread production, and analysis of produced breads.

The results obtained from physico-chemical and rheological analysis show that flours, Agimi and Progres cultivars, has very similar qualities and even better qualities than of other cultivars. Also from the results of bread production, is noticed that breads production from Agimi and Progres variety have better qualities than breads production by the flours of other cultivars.

Keywords: Wheat, technological qualities, physico-chemical properties, bread.

1. Introduction

The assessment of all grain crops grown and processed in Albania, the first voice of grain crops, of which about 90% of occupies soft wheat cultivar (*Triticum aestivum* L.). The flour obtained from the milling of these varieties used for bread production, partly in confectionary industry and production of pasta (Kljusurić S., 2000). Wheat varieties cultivated today are imported from neighboring countries; therefore they may be different from the quality of grain and flour quality. Such changes are mediated not only by genetic nature, but also by external factors that have an impact on technological qualities of grain, especially in breadmaking characteristics (P Payne, 1987; Bassett et al, 1989). Breadmaking qualities of grain are contingent on the amount and quality of protein in the grain (Lasztity, 2003) as the high protein content of very good effect on the volume and shape of the bread (Pomeranz, 1988). Significant impact on the quality of flour to these cultivars, along with reconciliations bukëbërëse properties have redox factors. Significant impact on the quality of flour of these cultivars, bukëbërëse properties along harmonization in breadmaking characteristics, have the redox factors also.

2. Materials and Methods

For this study they were wheat cultivars: Agimi, Progres, Ankor, Europa dhe Apache. Milling wheat cultivars is performed in the laboratory of flour factory "Diamond" where the grinding have won both factions flour Type-500 and Type-850, wheat residue and bran. By each cultivar were taken from 10 kg to grind and are conditioned for 18-24 hours to reach moisture 16.5% for grinding, where we won two factions flour Type-500 and Type-850, as well as with wheat residue and bran. After production and evaluation of flour obtained from these cultivars have been produced bread. First is the production of bread made from flour Tip-500 by adding and no additives. Where in electronic scales is weighing 1 kg flour, 15 g of table salt, 15 g of yeast dissolved Diego, water in based on the absorbing capability with Farinograf in temperature 30⁰ C. They are placed in the mixer where are mixed for 8 minutes, from here in fermentation rooms with temperature 30⁰ C and 60% humidity.

Then they were given forms with the weight of 750 g, located at the second fermentation and finally baking in the oven, 230-250⁰ C for 25 minutes. From the oven, the bread are placed on the table and have stayed for 24 hours to do other tests. In the second analysis test was taken the same amount of flour and other parameters, kitchen salt, water, yeast as the first test, but adding the appropriate amount of additives: ascorbic acid (30 mg / 1 kg flour), Xylenase HC2500 (30 mg / 1 kg flour), Lipase HC120y (5mg / 1kg flour) and Top Bake (3g / 1kg flour) (Official Methods of Analysis of the cereals, December (1988).

Physico-chemical analyzes are made in accordance with the ICC standard methods (dirt ICC stand. 102/1, ICC stand humidity. 110/1, ICC ash stand. 104/1, ICC wet gluten stand. 106/2). Determination of rheological qualities, is performed with Farinograph and Estensograph BRABENDER, Alveografi "Chopin" and organoleptic qualities of bread produced are conducted in accordance with the rules of physical-chemical methods of analysis for cereals, milling and bakery products, pasta and frozen dough (ICC-Standard No102/1, Revised 1972).

3. Results and Analysis

By each cultivar were taken from 10 kg for grinding and are conditioned for 18-24 hours to reach moisture 16.5% for grinding, where are won two factions flour Tip-500 and Tip-850, as well as with wheat and bran residue.

In table 1 are presents the amounts earned flour by milling wheat cultivars, where it can be observed that most often obtained flour by grinding cultivar Isengrain (3.2 kg Tip-500, 1.51 kg Tip-850) and least by cultivar Lenta (2.73 kg Tip-500 and 1.22 Tip-850) (Zawistowskua., Langstajf.F, and Bushukw., (1988)).

Table 1. Amount of flour produced by grinding of wheat cultivars.

Cultivars	White flour Tip 500 (kg)	Black flour Tip 850 (kg)	Wheat residue (kg)	Bran (kg)
Apache (France)	3.2	1.51	1.03	4.35
Ankor (Russia)	2.91	1.15	1.2	4.84
Progres (Albania)	2.73	1.22	1.42	4.73
Europa	2.9	1.21	1.55	4.54
Agimi	2.9	1.31	1.34	4.45

By the data in Table 1 shows that Apache variety provides greater amount of white flour (3.2 kg), compared with other wheats, but less grise that Progres and Europe varieties, which shows that both contain higher protein. Below are presented results obtained for physico-chemical and rheological qualities of flour received by each cultivar after grinding (Bassett L.M., Allan R.E., Rubenthaler G.L (1989)).

In Table 2 are given physico-chemical qualities of flour Type-500 and Type-850 of varieties mentioned. Humidity of all varieties is in normal value and it is between 13.5-14.2%. The amount of mineral resources, namely ash, for flour Tip-500 is about 0.55, so flour are white, while flour Tip-850, which have part of aleuronic adding inside, higher fiber content, and thus have darker color (GROSCH, W. (1986)).

Sediment determined by Zeleny test shows that Progres variety has the highest sediment, as a result and better gaz-formation quality (58 flour Tip-500 and 49 flour Tip-850); following the cultivar Agimi (51 flour Tip-500 and 41 flour Tip-850) while cultivars Europa and Apache have lower sedimentation, Europa variety has weaker sedimentation from all.

The amount of gluten, which is the main protein of technological qualities, is higher for flour Progres cultivars (31 Type-500 and Type-850) and Agimi (31 for Type-500 and Type-850), while other flour varieties have low amounts of gluten, 20-22, which have the necessary use of additives to ensure good baker quality (ATKINS, J. H. C. (1971)). Also flour gained from Progres variety has also the highest amount of protein (13.1% Type-500 and 14.9% Type-850) all other flours have lower amounts of protein (from 10.3 - 11.6%), only flour Tip-850 of Agimi variety has 12.2% protein amount. Higher amount of sugar has flour Tip-500 of Apache variety (58.4%), that affects in better fermentation of the dough increasing pores and volume of baking products. While flour of Europa and Progres varieties have sugar content between 56.7-56.5%; near with this value is Andolu variety whith 55.4, while Europa variety content 48.2% (ANON. (1957)).

Higher absorption ability havethe folurs of Agimi variety (65% Tip-500 and 66% Tip-850), where follow Progres variety with 64% Tip-500 and 65% Tip-850, while others flour varieties have absorbing capability by 62-64%. This indicator affects directly to the growth of bread radius.

Table 2. Physico-chemical and rheological qualities of flours obtained from each cultivars after grinding.

Qualities indicative of cultivars	Cultivars									
	Progres		Europa		Agimi		Europa		Apache	
	Flour		Flour		Flour		Flour		Flour	
	T 500	T 850	T 500	T 850	T 500	T 850	T 500	T 850	T 500	T 850
Humidity (%)	13.7	13.3	14.2	13.8	13.7	13.8	14.2	13.8	14.1	13.5
Ashe	0.57	0.76	0.58	0.81	0.67	0.74	0.56	0.79	0.56	0.76
Sedimentation (ml)	58	49	40	33	51	41	36	31	41	40
Wet gluten (%)	31	31	20.5	20	30	30	22	19	21	18
Proteins (N x 5.7) (%)	13.1	14.9	10.3	11.2	10.5	12.2	10.9	11.4	11.0	11.6
Sugars (%)	56.5	-	56.7	-	55.4	-	48.2	-	58.4	-
Water absorption (%) Farinograph	64	65	62	63	65	66	62	63	62	64
Value "W" "Chopin" Alveograph	170	-	85	-	229	-	98	-	78	-
R/E Estensograph	1.1	0.9	2.7	1.8	2.6	1.6	1.7	0.9	2.5	1.6
Energy (cm ²) Estensograph	55	-	52	-	68	-	29	-	60	-

Flour power value (W) in correlation with the quantity and quality of protein shows that flour Tip-500 of Agimi variety has the highest value, followed by the flour of Progres variety with strongly 170, while others flour varieties have strength in low level - in value below 100 (HOSENEYR., C. (1986)).

Optimal ratio between resistance and elasticity (R / E) for breadmaking is 1.5-2.5, where most of the results is optimal limits; only flour Tip-850 of Progres and Europa cultivars have very low ratio 0.9.

Energy of dough presents the value of the surface occupied by abscissa curve and is expressed in cm². Higher energy have flour of Progres variety (68 cm²), following Apache variety (60cm²), Progres variety (55cm²), Ankor variety (52cm²) and Europa variety in value 29 cm² (ANON. (1957)).

By the above data shows that in general W is low. This makes it necessary to harmonize these grains before milling, as well as supplements with additives (ANON. (1957)).

After production and evaluation of flour acquired, are produced bread. First is the production of bread made from flour Type-500 and Type-850 without additives and supplements (Pomeranz, Y. (1988)). In Table 3 and 4 are given the qualities of the bread produced from flour Type-500 and Type-850, with and no additives (Grosch, .W. (1986)).

Table 3. Quality of the bread produced from flour Tip-500 without and with additives.

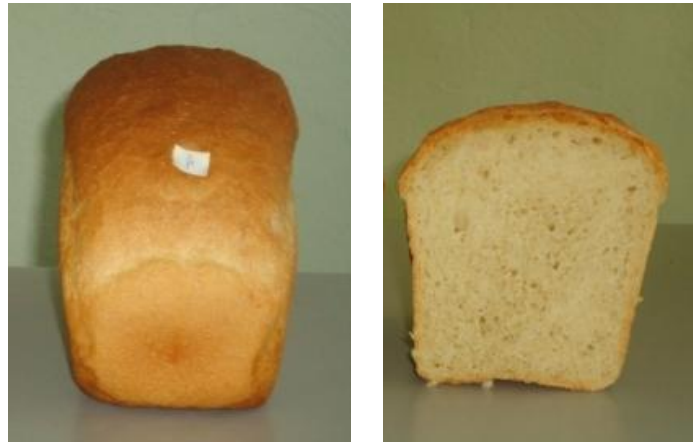
Qualitative indicators of bread	Bread from flour Tip-500									
	Progres		Europa		Agimi		Ankor		Apache	
	Without additives	With additives	Without additives	With additives	Without additives	With additives	Without additives	With additives	Without additives	With additives
Weight of bread (g)	503	508.8	488.7	500	500	498.2	498.3	496.3	509.5	500
Radius bread (%)	143.2	144.6	140.4	142.6	142.5	143.1	142.8	142.9	145.1	143.7
Yield of volume (cm ³)	2108	2280	1914	1885	1728	2208	1827	1755	1728	1792
Bread acidity	2.2	2.3	2.52	2.64	2.52	2.63	2.55	2.65	2.4	2.5
Color of the bread crust	The reddish, full-blown	The reddish, closed	The reddish, full-blown	The reddish, closed	The reddish, closed	The reddish, closed	The reddish, full-blown	The reddish, full-blown	The reddish, full-blown	The reddish
Porosity by Dalmatian	7	7	7	7	8	7	8	7	7	6
Smell	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Taste	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium

By Table 3 shows that bread produced from flour Tip-500 of Progress variety have radius and higher volume, compared with Europa, Agrimi and Ankor variety (HOSENEYR, . C. (1986)).

Table 4. Quality of the bread produced from flour Tip-850 without and with additives.

Qualitative indicators of bread	Bread from flour Tip-850									
	Progres		Europa		Agimi		Ankor		Apache	
	Without additives	With additives	Without additives	With additives	Without additives	With additives	Without additives	With additives	Without additives	With additives
Weight of bread (g)	501.9	504.7	494.2	498.9	497.7	497.8	499.1	505.9	493.2	503.2
Radius bread (%)	141.3	141.4	139.8	139.6	140.4	140.7	140	141.8	135.1	139.7
Yield of volume (cm ³)	1980	2380	1980	1792	1985	2035	1950	1950	1943	2077
Bread acidity	2.5	2.65	2.48	2.62	2.5	2.66	2.5	2.68	2.40	2.55
Color of the bread crust	The reddish, closed	The reddish, closed	The reddish, closed	The reddish, closed	The reddish, closed	The reddish, closed	The reddish, closed	The reddish, closed	The reddish, closed	The reddish, closed
Porosity by Dalmatian	7	7	8	8	7	8	8	8	7	8
Smell	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Taste	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium

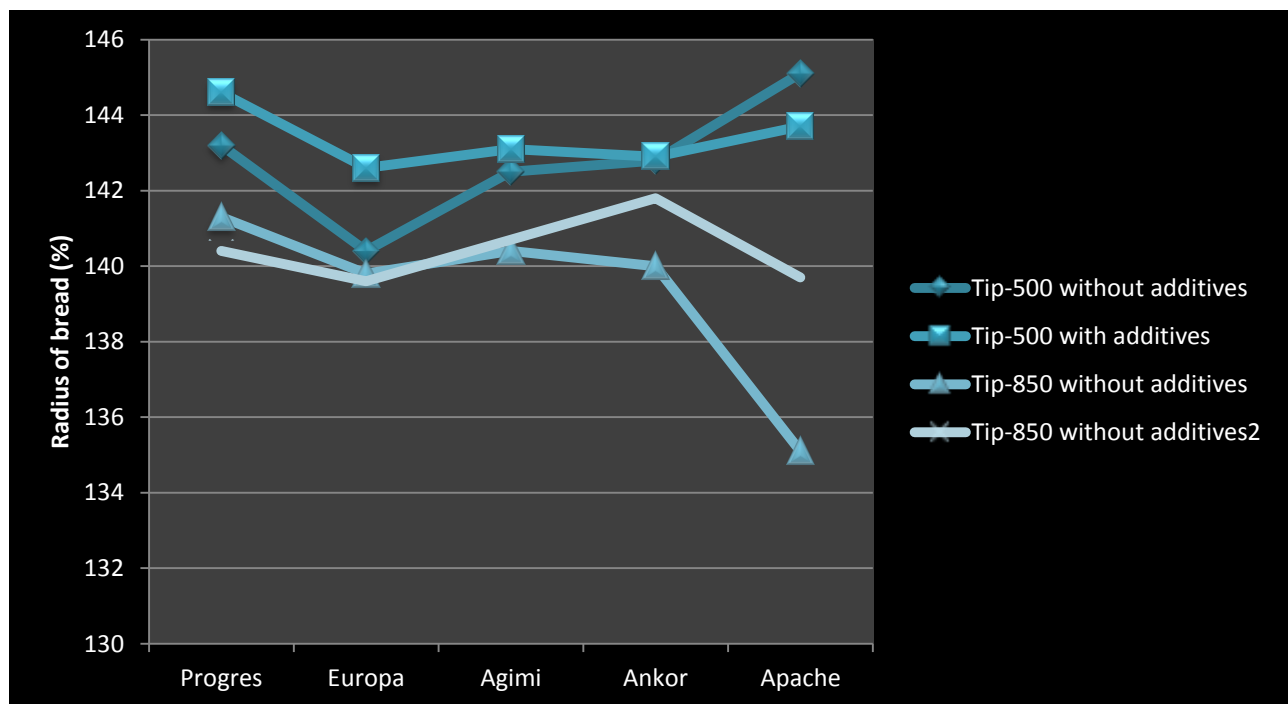
Figure 1. Photos illustrating the bread untreated and treated with additives.



Reference + 20 ppm α -amylase.

All the bread produced from flour Tip-500, with additions (additives) generally they range higher than those without supplements, which can be seen in Graph 1. The same has been shown for flour Tip-850, using 20 ppm α -amylase, so bread with additives have a range higher than bread without additives.

Graph 1. Radius of bread produced from flour Type-500 and Type-850 with and without additives.



Yield of bread volume produced from flour Tip-850 is higher than that bread produced with flour Tip-500, either with or without additions (Sinani, 2009). A small number of bread has ratings for very good volume (bread produced with flour Type 850 and Type 500 by Progres variety with additions in 2380 cm³, 2280 cm³), while most other bread, regardless of the type of flour or cultivar, have volume very good or good, only bread produced by flour Tip-500 of Ankor variety, with and without additives, has good rating and bread with flour Tip-500 of Agimi variety has bed rating.

The acidity of bread is normal, but the bread produced from flour Tip-500 have lower acidity. Also all the bread produced with the addition of the same type of meal have higher acidity than bread produced without additives. The color of the bread crust obtained with flour Tip-500 is reddish in blown, except a bread produced with additives. All the bread produced with flour Tip-850 are colored in dark red (Payne P. I. (1987).

All the bread of flour produced with Type-500 and Type-850, or with or no additives, have porosity by Dalmatian 7 and 8, while the bread produced by flour Tip-500 with the addition of Isengrain variety has porosity 6 (GROSCH, W. (1986)).

All the bread produced with flour Tip-500 or Tip-850, with or without additives, have tastes and smell characteristic of bread (Pomeranz, Y. (1988)).

4. Conclusions

1. From the result obtained for the physico-chemical qualities and rheological cultivars that cultivated and processed in Albania can conclude that from varieties selected from flour Tip-500 has better quality Agimi variety, since has amount

of wet gluten 30%, sediment 51 ml, very high value of the strength of flour by Alveografit 229 and energy by Estensogram of 68 cm².

2. There are similar quality flour Tip-500 of Progres variety with the amount of wet gluten 30%, sediment 58 ml, value of Alveograph 170 and power of 55 cm². Also flour Tip-850 from Agimi and Progres varieties have better quality physico-chemical and rheological.

3. By the bread produced with flour Tip-500, bread from Progres variety with extras has radius and higher volume (144.6% and 2280 cm³), also very good porosity by Dallmati and color, smell and taste very good.

4. From the bread produced with flour Tip-850, the best quality has the bread produced with additions by Progres variety because has weight, beam and very good volume (504.7 g, 141.3% and 2380 cm³) and color, smell and taste very good.

5. Finally, Agimi and Progres varieties have better physico-chemical and rheological quality, and bread making; all other cultivars taken into study are usable, but with mixture 20-30% (with Agimi and Progres) or by use of additives (20 ppm).

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