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"Young people and multidisciplinary
research in applied life sciences"

Physical-chemical and structural characterization of ten samples of wheat and of ten
samples of flour type 000 extracted from them

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Abstract:

The aim of the study is to monitor the physical-chemical and structural characteristics of 10 types of wheat harvested from ten different locations in Satu Mare and Maramureş counties (Figure 1), as well as ten varieties of flour type 000 obtained from them. The wheat samples analyzed are from the 2023 production and were grown on soils classified as luvisols, alluviosols, and gleysols.

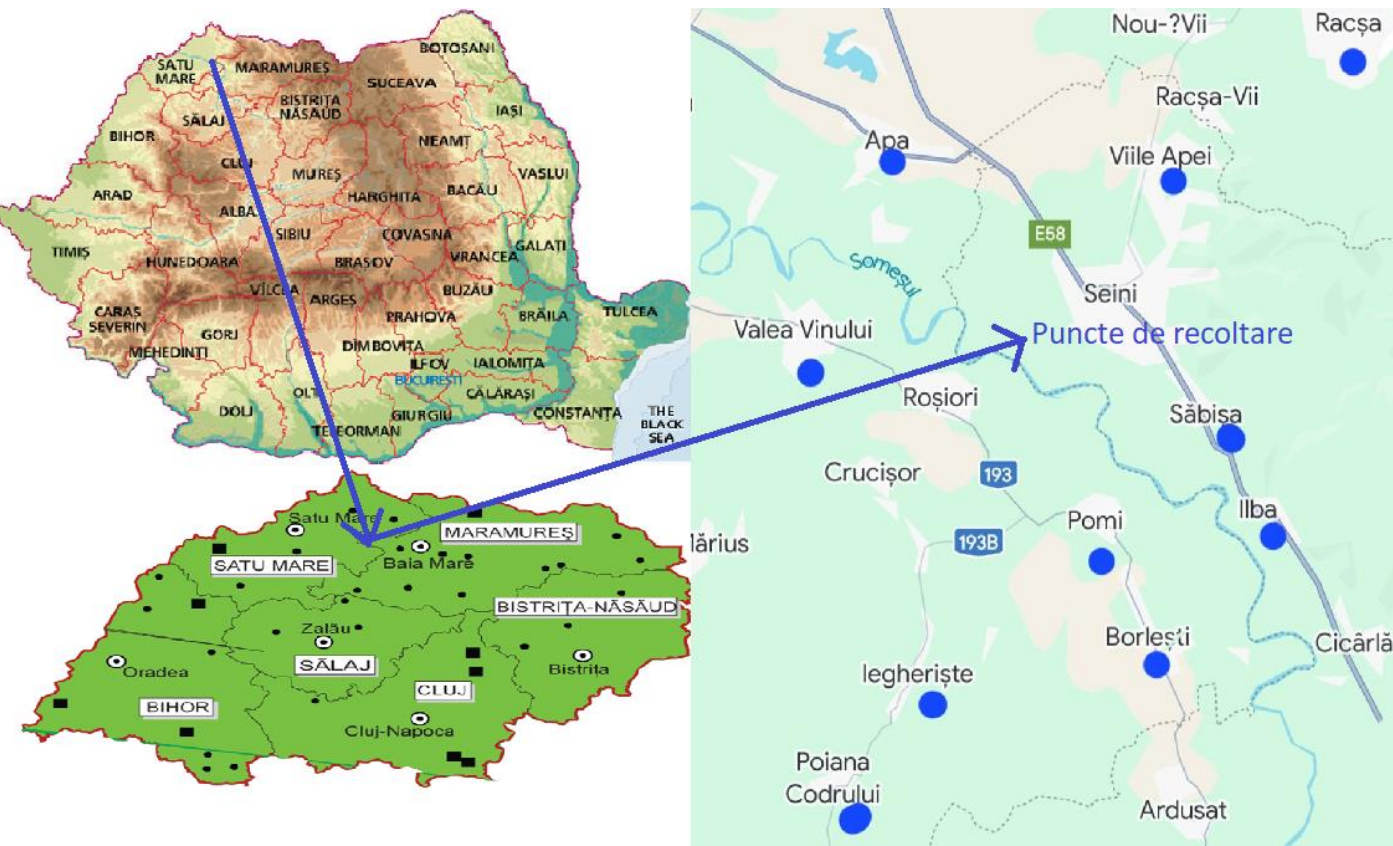


Figure 1. Wheat Origin Zones

Introduction

Cereals are a basic ingredient in the food supply chain, which should be continuously available for the world's population [McKevith B., 2004]

Over time, two types of wheat have developed - common wheat (*Triticum aestivum*), suitable for the baking process, and durum wheat (*Triticum turgidum*), used in the manufacture of pasta [web 1].

After the sowing period, wheat is divided into two categories - autumn wheat (needs lower temperatures for flowering 3 - 10°C) and spring wheat (necessary temperature for flowering is not very low 7 - 18°C).[web 1]

Depending on the type of wheat, the flour obtained from it can be:

- universal flour - grinding the endosperm from durum and soft wheat
- baking flour - has a higher gluten content
- flour with raising agent – has added raising agent
- flour for cakes - resulting from soft wheat, with a low protein content
- semolina – resulting from grinding durum wheat, with a high protein content
- durum flour – obtained from semolina by adding vitamin B and iron. [web 1]

Results for wheat characterization

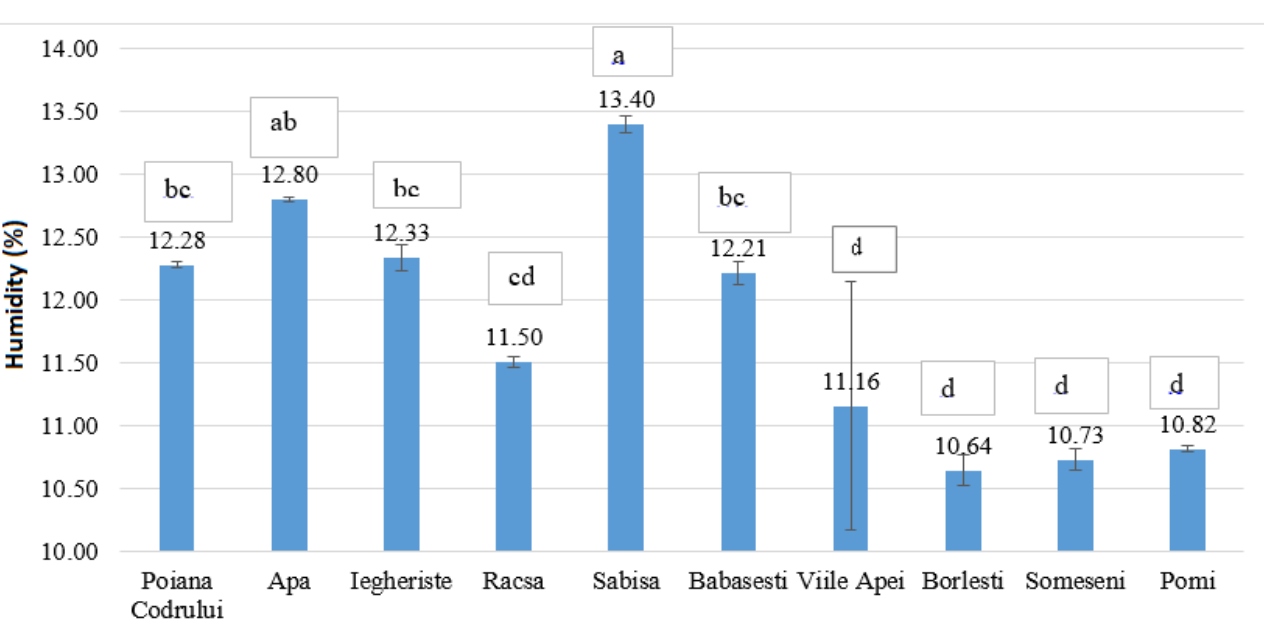


Figure 2. Wheat moisture

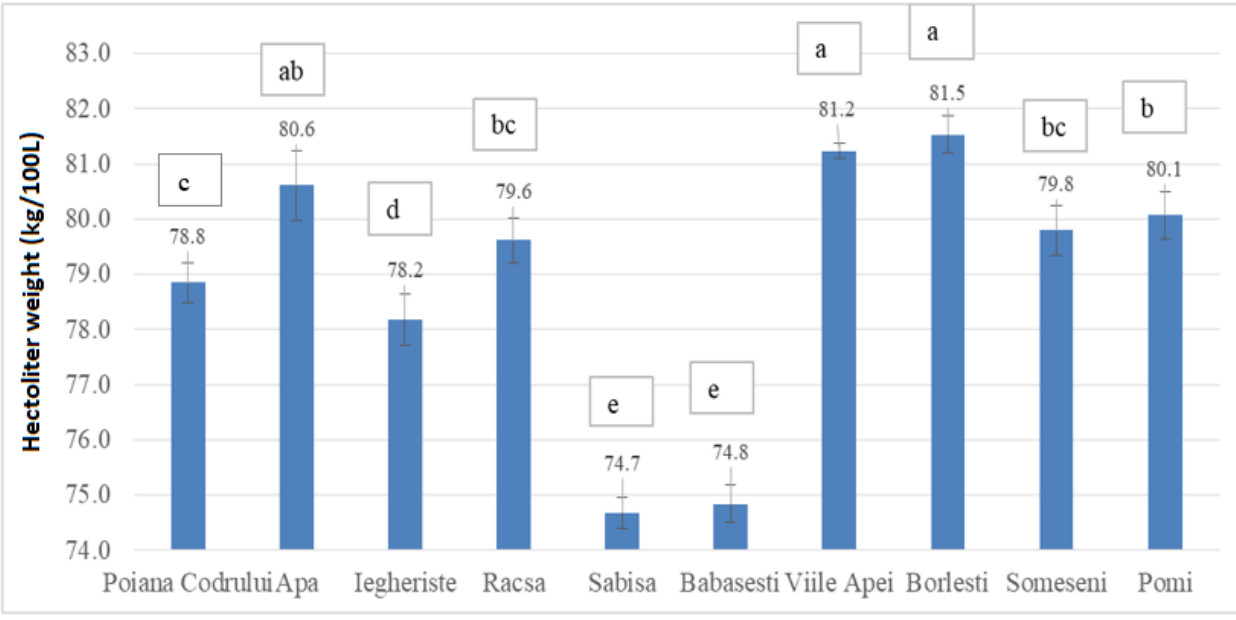


Figure 3. Wheat hectoliter mass

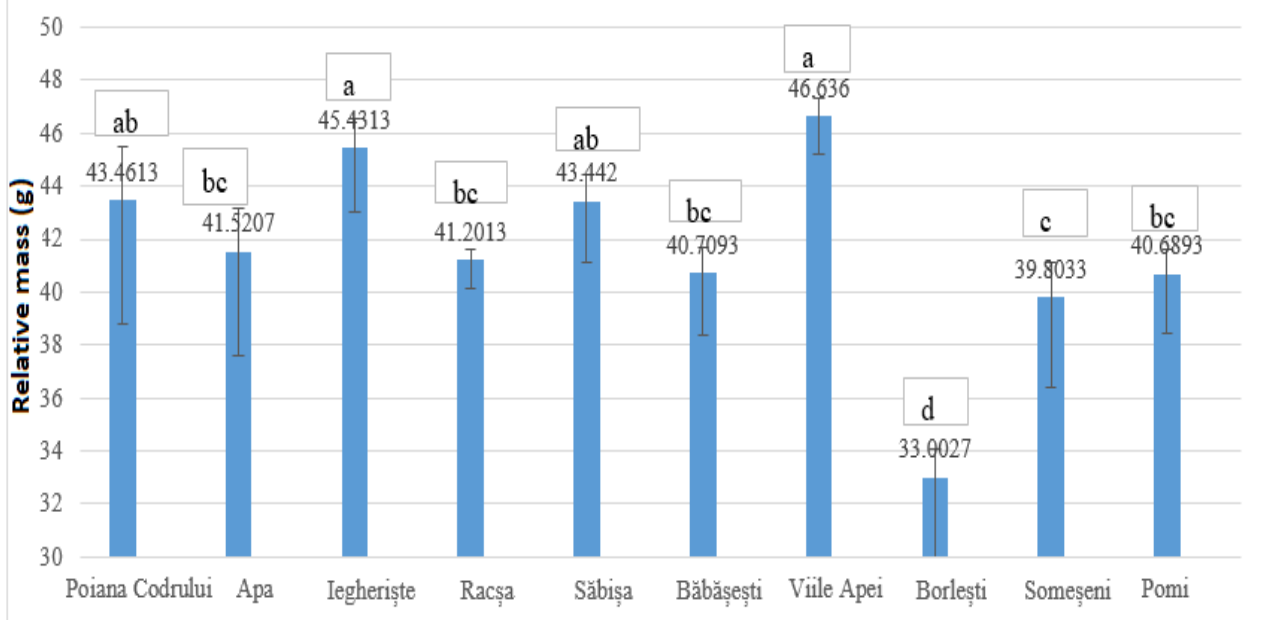


Figure 4. Wheat relative mass

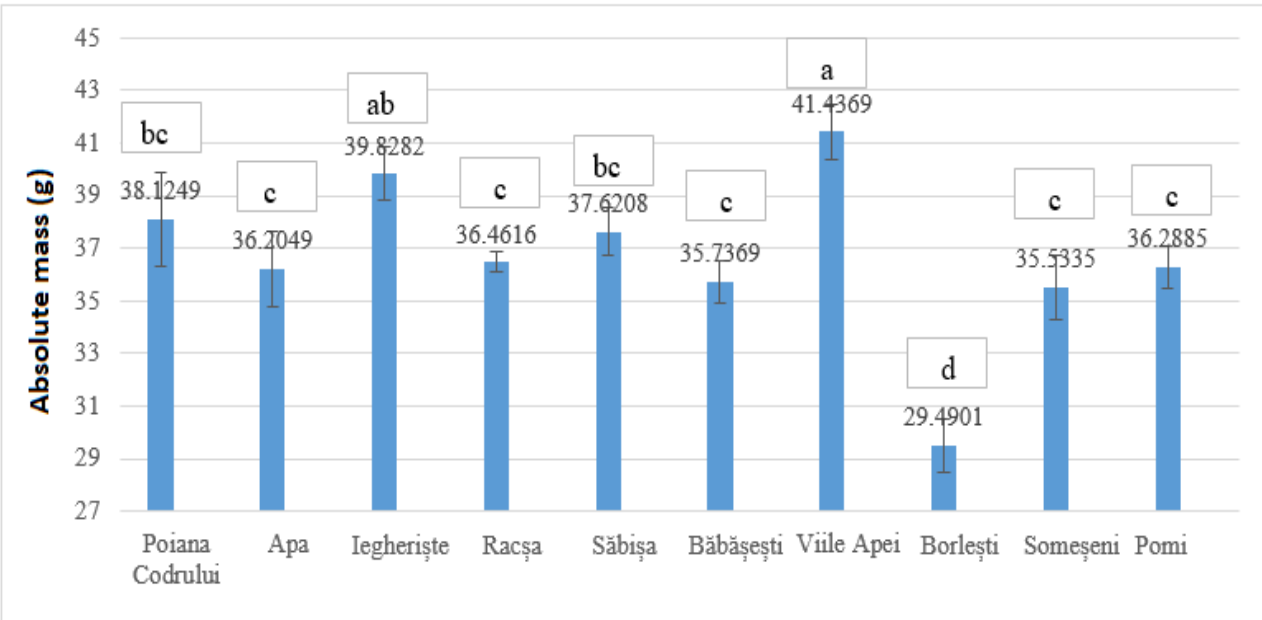


Figure 5. Wheat absolute mass

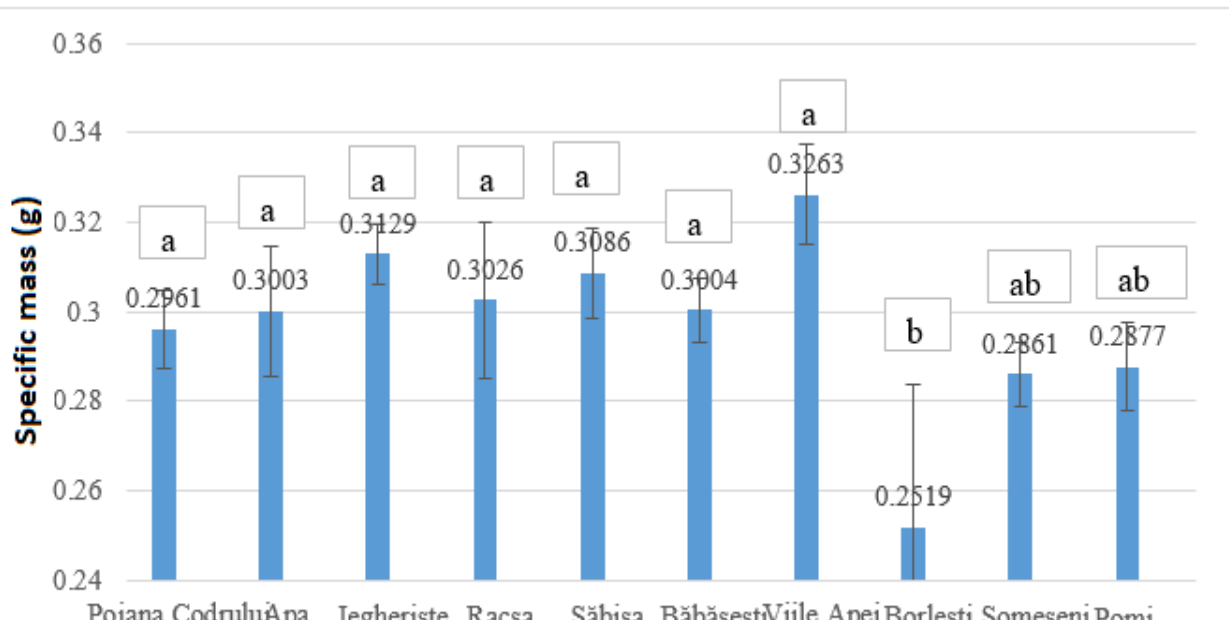


Figure 6. Wheat specific mass

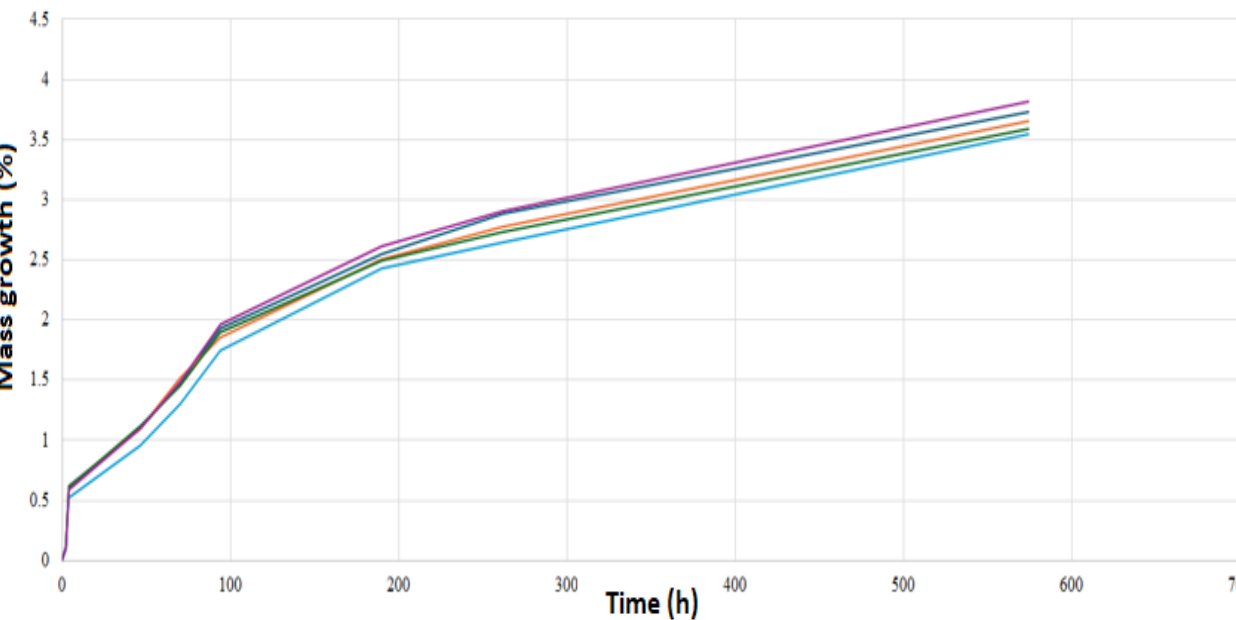


Figure 7. Capacity of water vapor absorption by wheat

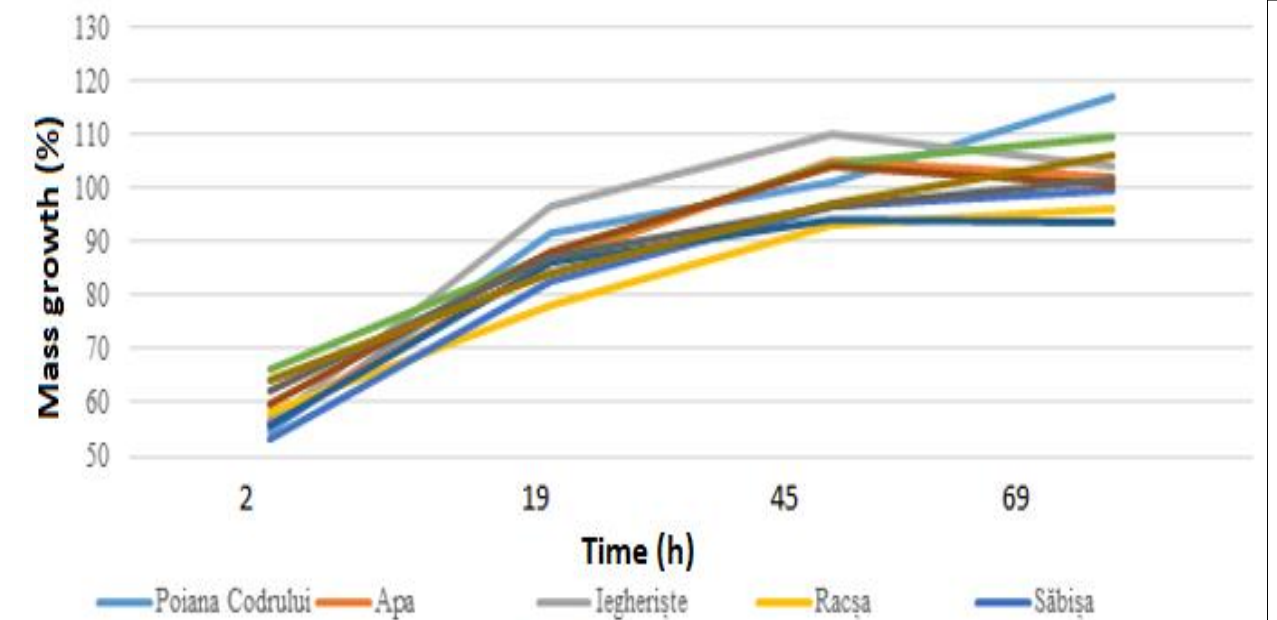


Figure 8. Capacity of liquid water absorption by wheat

References:

McKevith B., „Nutritional Aspects of Cereals British Nutrition Fundation” Londra, 2004.

web 1: <https://www.yara.ro/nutritia-plantelor/grau/wheat-categorization/>

Results for flour characterization

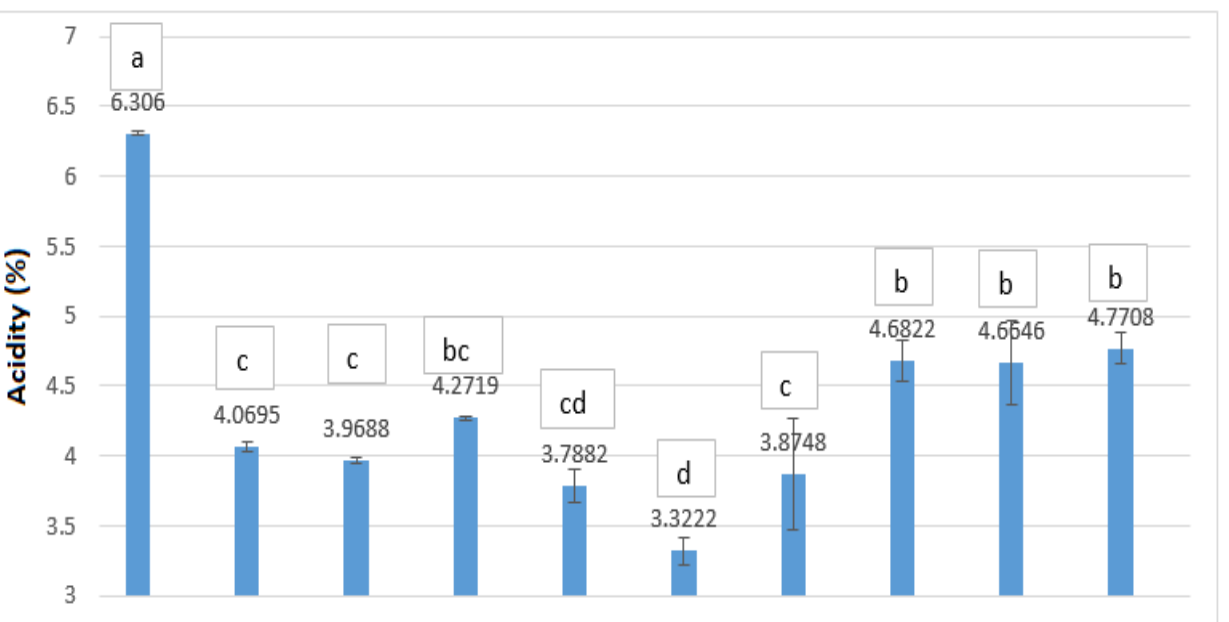


Figure 9. Flour acidity

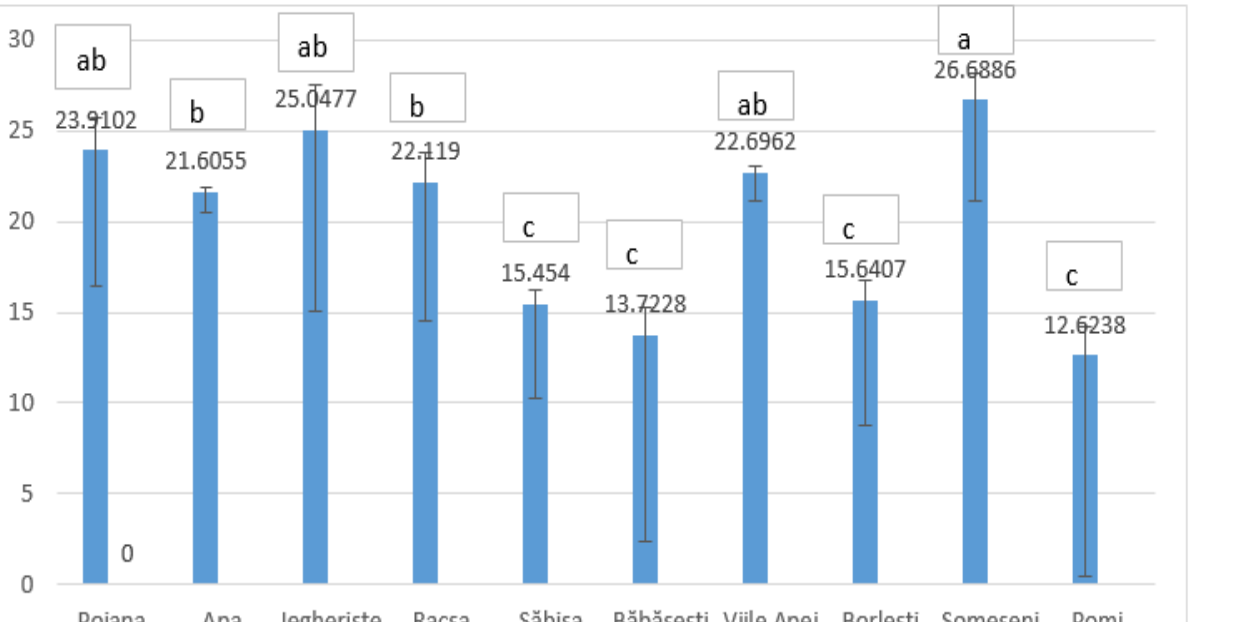


Figure 10. Wet gluten from flour

	L*	a*	b*	color
F1	95.866	-1.788	5.782	
F2	95.917	-1.562	5.155	
F3	95.933	-1.436	4.825	
F4	95.895	-1.608	5.024	
F5	95.833	-1.777	5.14	
F6	95.797	-1.892	5.627	
F7	95.772	-2.081	6.108	
F8	95.868	-1.821	5.398	
F9	95.88	-1.601	5.187	
F10	95.733	-2.317	6.277	

Table 1. Colorimetric parameters of flour

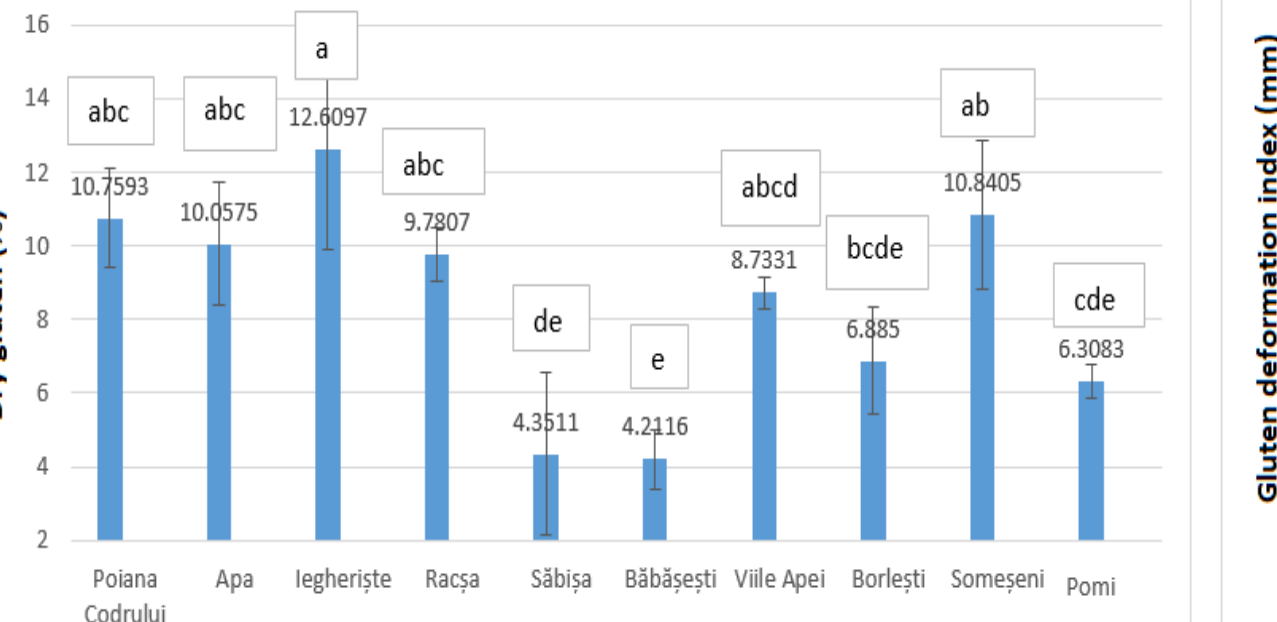


Figure 11. Dry gluten from flour

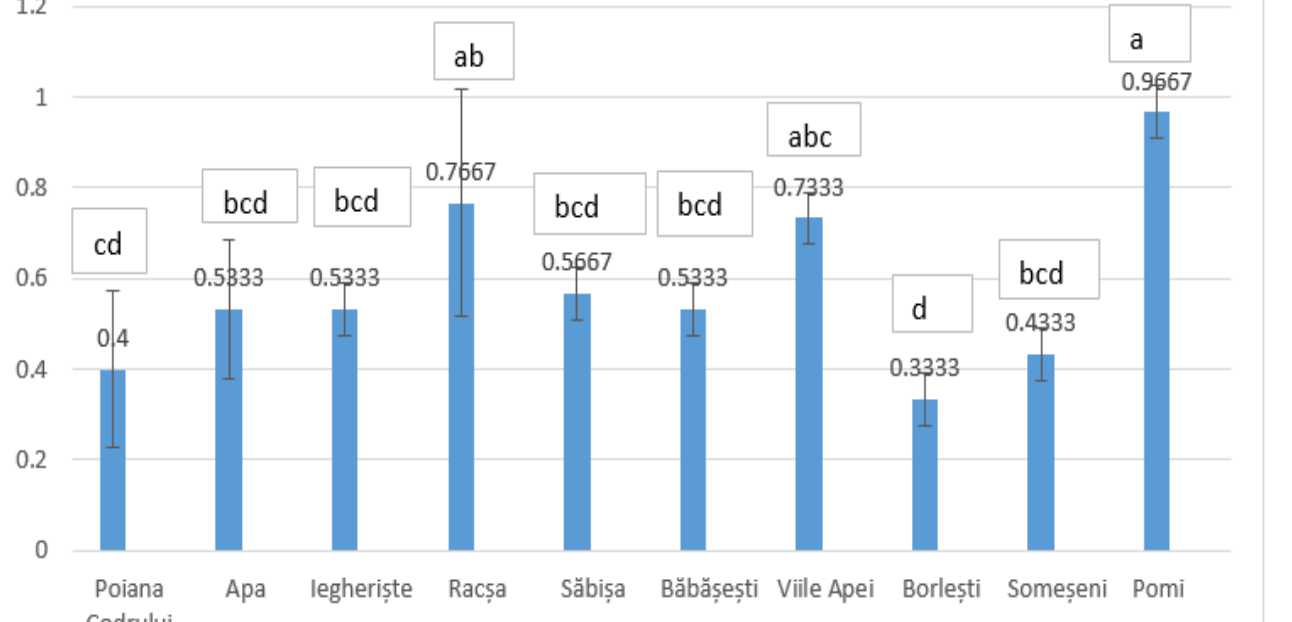


Figure 12. Deformation index of gluten of flour

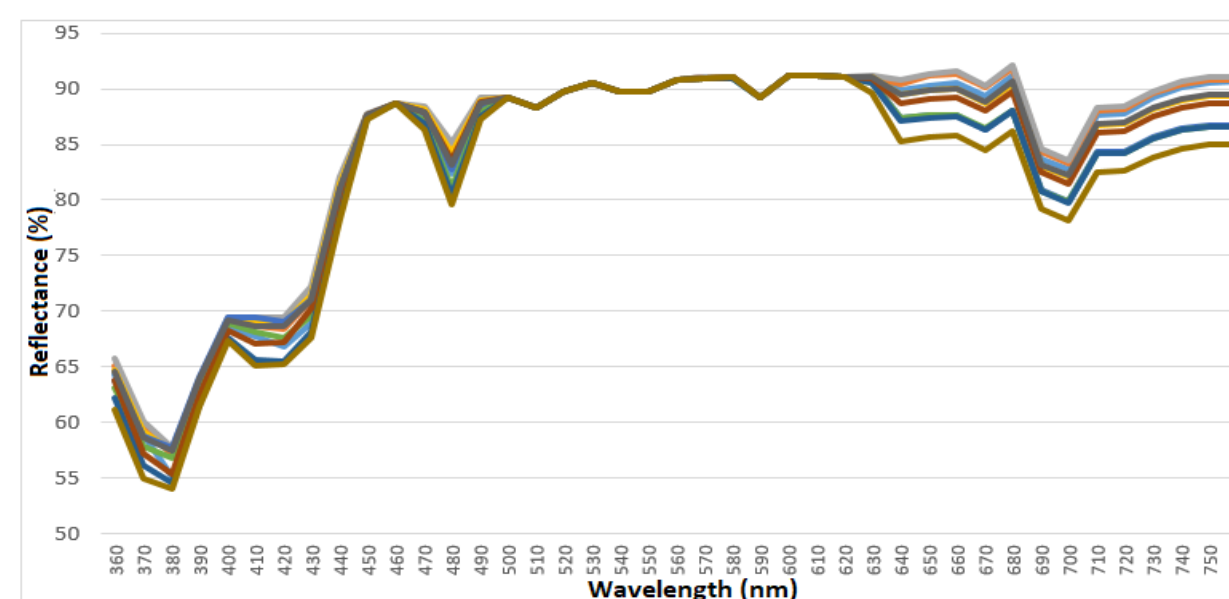


Figure 13. Flour reflectance spectra

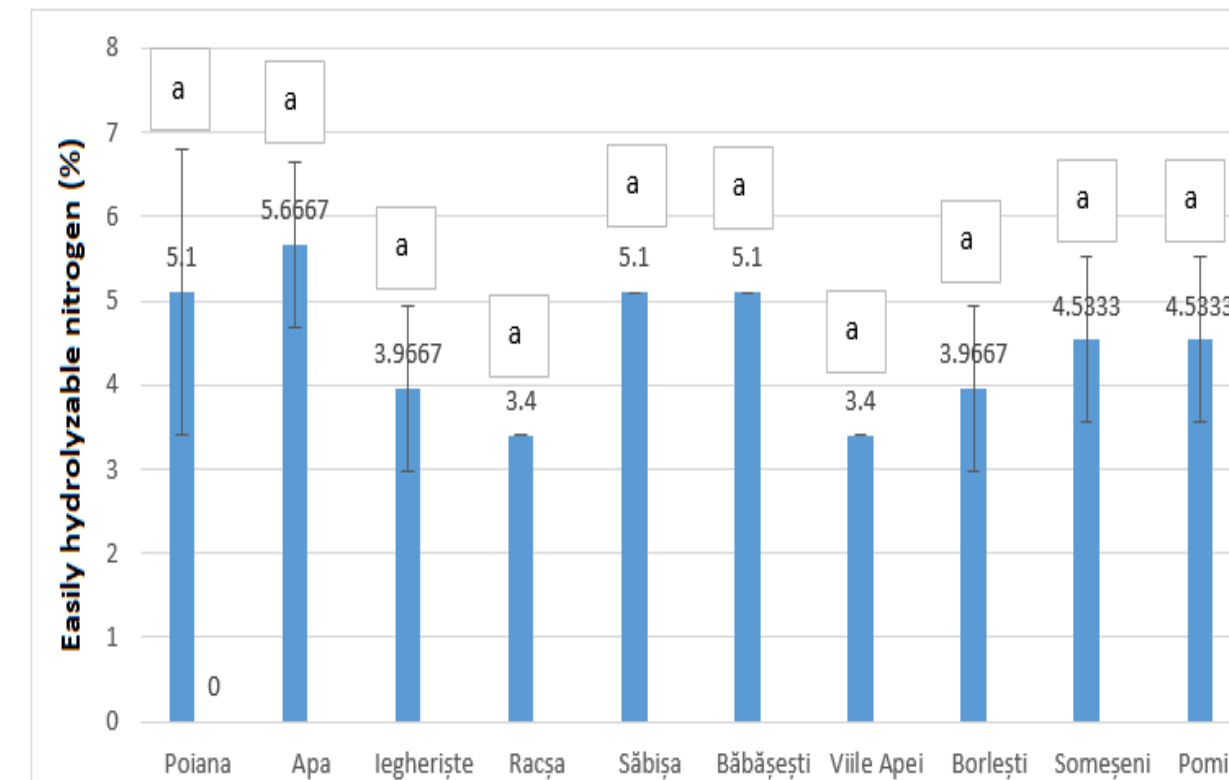


Figure 16. Easily hydrolysable nitrogen of flour

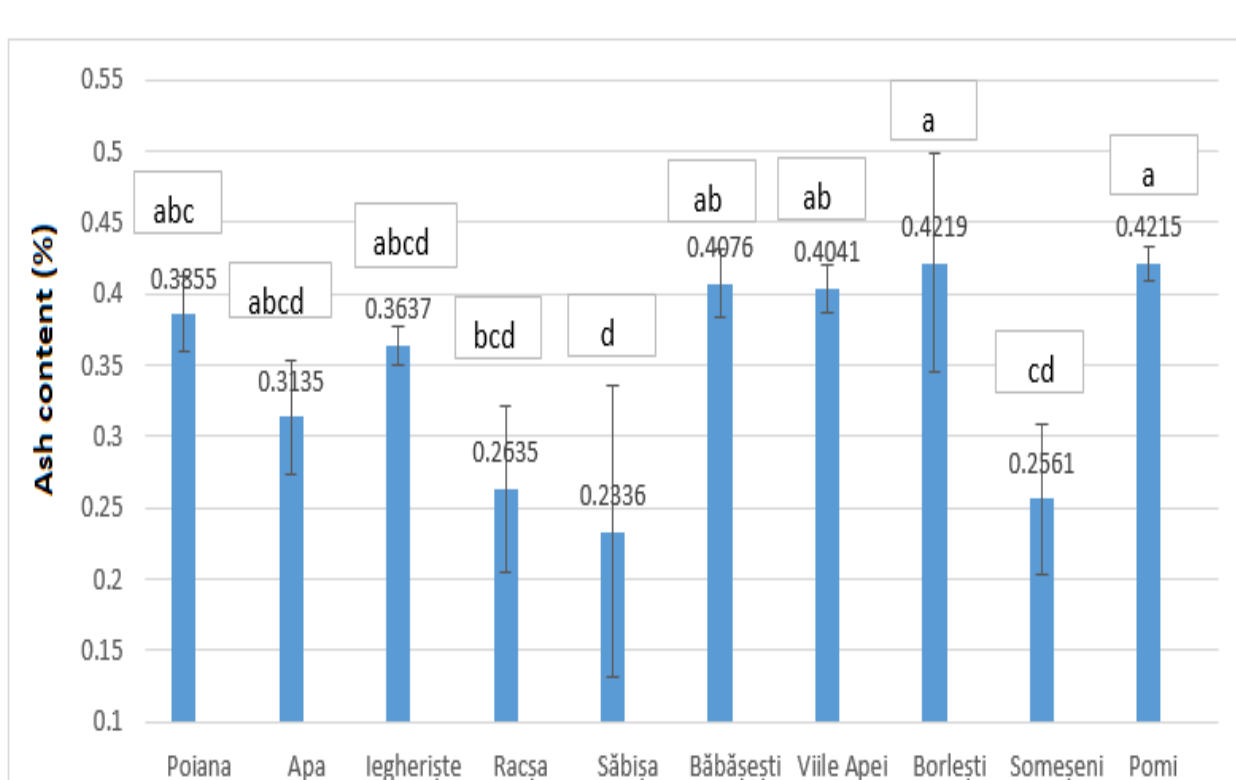


Figure 17. Ash content of flour

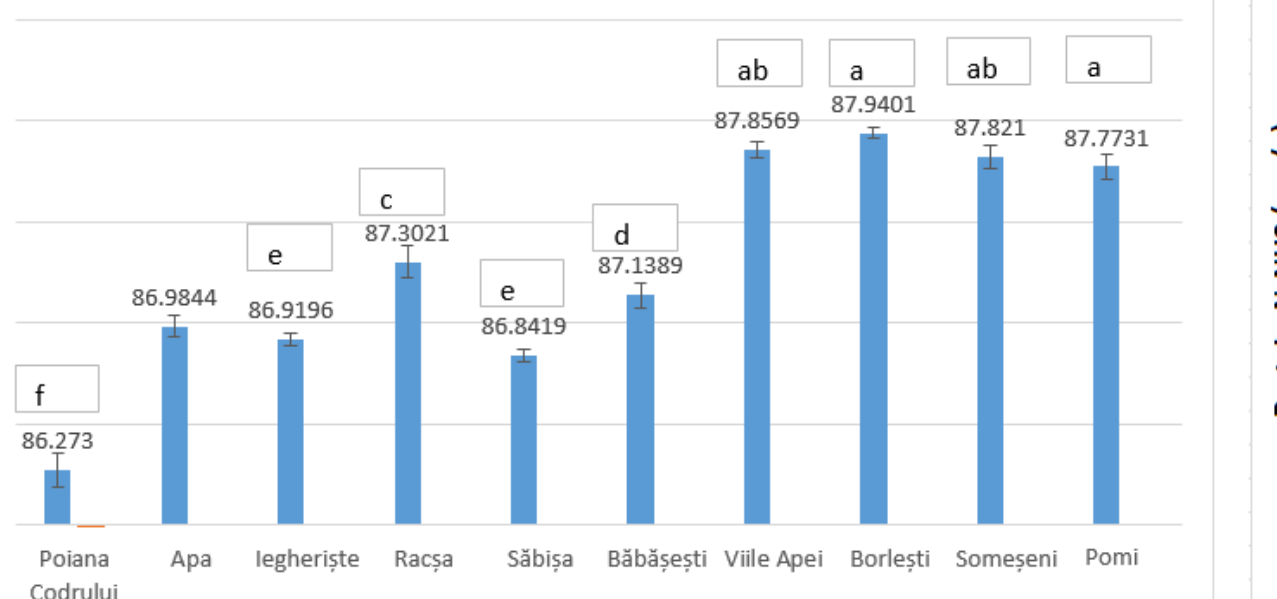


Figure 14. Flour humidity

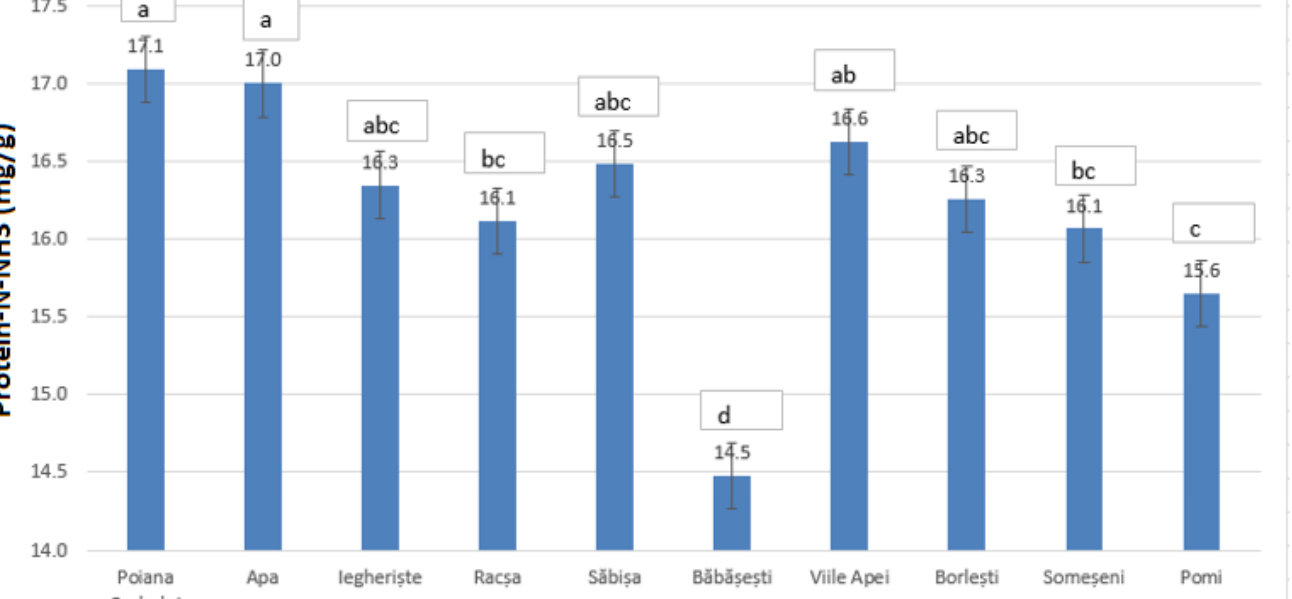


Figure 15. Flour protein content

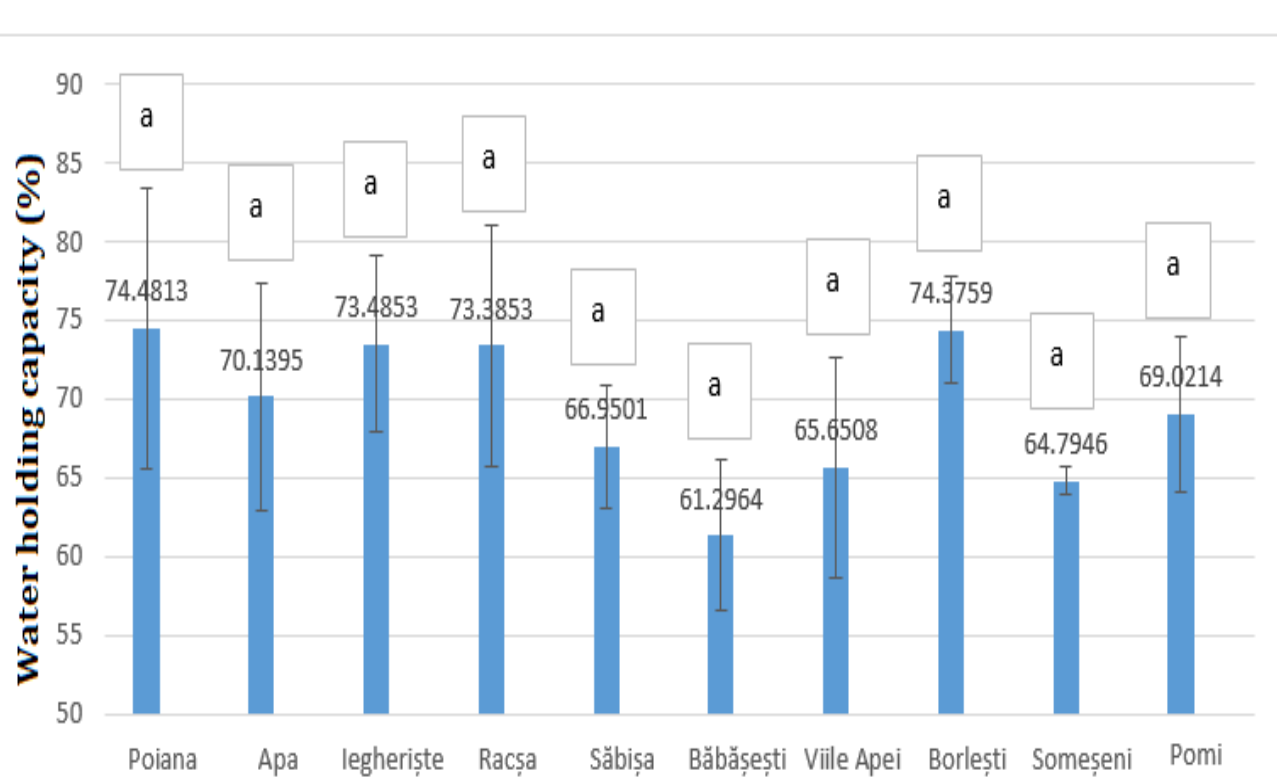


Figure 18. Capacity flour Water retention

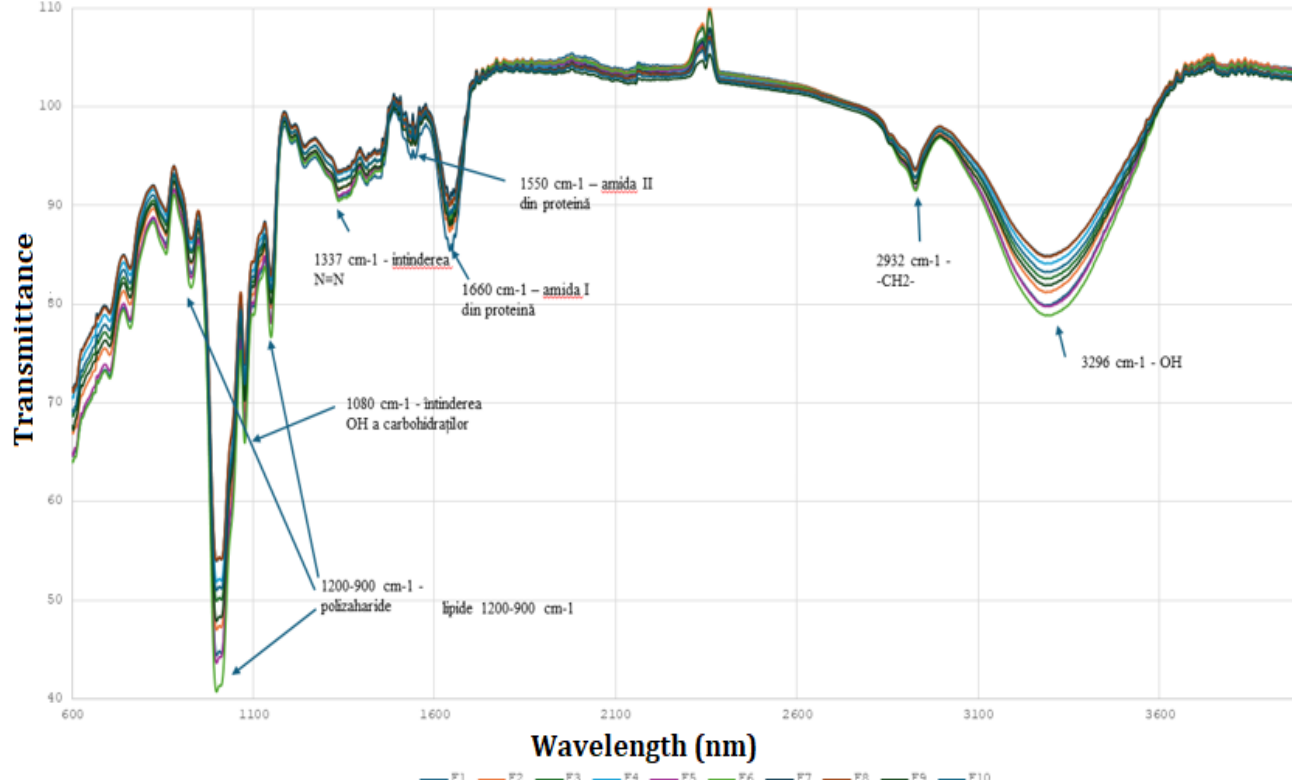


Figure 19. FTIR spectra of flour samples

Acknowledgement:

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